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FINAL WORK PLAN FOR THE REMEDIAL/ REMOVAL ACTION AT SITE 42 AND SITE 17
WITH TRANSMITTAL NSWC INDIAN HEAD MD
9/1/2005
FIELD SUPPORT SERVICES



6303 Ivy Lane, Suite 800
Greenbelt, MD 20770

September 1, 2005

Mr. Jeff Morris
1314 Harwood Street, SE
Washington Navy Yard, DC 20374-5018

Ref: Final Work Plan—Remedial/Removal Action for Site 42 and Site 17
Naval District Washington Indian Head (NDW-IH)
Contract No. N62470-03-D-4402
Task Order No. 011

Dear Mr. Morris:

Field Support Services, Inc., (FSSI), is pleased to submit the attached Final Work Plan for the Remedial/Removal Action at Site 42 and Site 17 at NDW-IH located in Indian Head, Maryland.

Should you have any questions please call me at 301-837-5500.

Sincerely,

A handwritten signature in black ink, appearing to read 'Paul Karmazinski', with a long horizontal stroke extending to the right.

Paul Karmazinski
Program Manager

CC: Shawn Jorgensen, NDW-IH
Cathy Gardner, NDW-IH
Dennis Orenshaw, USEPA Region III
Curtis DeTore, MDE
Jim Dunn, Shaw
Steve Carriere, Shaw

I have received a copy of the Work Plan and/or relevant attachments for activities at Indian Head with respect to my company.

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B	Project Specifications
C	Design Drawings
D	Erosion and Sedimentation Control Plans (ESCP) Amendment
E	Environmental Protection Plan (EPP)
F	Site Specific Health and Safety Plan (SSHSP)
G	Quality Control (QC) Plan
H	Explosive Safety Submission (ESS) Waivers
I	Accutest Laboratory Quality Control Information
J	Shaw Field Sampling Standard Operating Procedures

List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
°C	degrees Celsius
COC	Chain-of-Custody
COMAR	Code of Maryland Regulations
DDESB	DoD Explosives Safety Board
DRO	Diesel Range Organic
E&S	Erosion and sediment
EE/CA	Engineering Evaluation/Cost Analysis
EPP	Environmental Protection Plan
ERA	Ecological Risk Assessment
ESCP	Erosion and Sediment Control Plan
ESS	Explosive Safety Submission
FDEP	Florida Department of Environmental Protection
FSSI	Field Support Services, Inc.
GC/MS	Gas Chromatography Coupled Mass Spectroscopy
GRO	Gasoline Range Organic
IATA	International Air Transport Association
ISO	common short name for the International Organization for Standardization
LANTDIV	Department of the Navy, Atlantic Division
LCS	Laboratory Control Samples
LGP	low ground pressure
LLDPE	Linear Low Density Polyethylene
MB	Method Blank
MDE	Maryland Department of the Environment
MDSHA	Maryland State Highway Administration
MEC	munitions and explosives of concern

List of Acronyms (Continued)

MS	Matrix Spike
MSD	Matrix Spike Duplicate
Navy	United States Department of the Navy
NDW-IH	Naval District Washington Indian Head
NEESA	Naval Energy and Environmental Support Activity
NELAC	National Environmental Laboratories Accreditation Conference
NFESC	Naval Facilities Service Center
NOSSA	Naval Ordnance Safety and Security Activity
NTR	Navy Technical Representative
PA	Preliminary Assessment
PBA	Project Business Administrator
pH	potential of Hydrogen
PPE	Personal Protective Equipment
ppm	parts per million
PRGs	Preliminary Remediation Goals
PVC	Polyvinyl chloride
QA	quality assurance
QC	quality control
RAC	Remedial Action Contract
RBC	Risk-Based Concentrations
RI	Remedial Investigation
ROICC	Resident Officer in Charge of Construction
Shaw	Shaw Environmental, Inc.
SOPs	Standard Operating Procedures
SOW	Scope of Work
SSHSP	Site-Specific Health and Safety Plan
SSO	Site Safety Officer
SUXOS	Senior Unexploded Ordnance Supervisor
SVOCs	Semi-Volatile Organic Compounds
TAT	turn around time

List of Acronyms (Continued)

TCE	Trichloroethene
TCLP	Toxicity Characteristic Leachate Procedure
TP	technical paper
TPH	Total Petroleum Hydrocarbons
TtNUS	Tetra Tech NUS
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
VOCs	Volatile Organic Compounds

1.0 Introduction

The Field Support Services, Inc. and Shaw Environmental, Inc. (FSSI/Shaw) team has been tasked to perform the remedial/removal action activities at Site 42 (Olsen Road Landfill) and Site 17 at the Naval District Washington Indian Head (NDW-IH) located in Indian Head, Maryland (Figure 1-1). FSSI/Shaw has prepared this Work Plan in accordance with the Scope of Work (SOW) for Task Order 011 (Dated March 29, 2005) under the Department of Navy, Atlantic Division (LANTDIV) Contract N62470-03-D-4402.

This Work Plan provides a detailed description of the remedial/removal action activities to be performed at Site 42 and Site 17. Per the SOW, several documents and plans have been prepared in support of this Work Plan and are presented in the following Appendices of this Plan:

- Appendix A Project Schedule
- Appendix B Project Specifications
- Appendix C Design Drawings
- Appendix D Erosion and Sedimentation Control Plans (ESCP) Amendment
- Appendix E Environmental Protection Plan (EPP)
- Appendix F Site-Specific Health and Safety Plan (SSHSP)
- Appendix G Quality Control (QC) Plan
- Appendix H Explosive Safety Submission (ESS) Waivers
- Appendix I Accutest Laboratory Quality Control Information
- Appendix J Shaw Field Sampling Standard Operating Procedures

1.1 Basis of Work Plan

The work plan for this task order is based on the following project-specific documents:

- Site 17 Engineering Evaluation/Cost Analysis (EE/CA), CH2MHill, dated August 2004.
- Final Remedial Action Design, Site 42 – Olsen Road Landfill, TetraTech NUS (TtNUS), dated March 2005.

- FSSI/Shaw cost proposals, dated March 21, 2005.
- SOW for Contract No. N62470-03-D-4402 Task Order 011, March 29, 2005.

1.2 Site Background

1.2.1 Site Background for Site 42

Site 42, known as Olsen Road Landfill, comprises approximately 1.43 acres in the southwestern portion of NDW-IH. The site includes a portion of the paved area south of Building 1866 and the undeveloped land west, southwest, and south of Building 1866 (Figure 1-2). The site slopes gently to the south in the area of Building 1866, with steeper grades to the south, west, and east within the remaining undeveloped portion of the site. Debris visible in the undeveloped portion of the site includes construction rubble, unlabeled empty cans and drums, wooden pallets, and branches.

Between 1982 and 1987 and during construction of Building 1866 in 1992, a 1.43-acre area near the current location of Building 1866 was used as an unauthorized disposal site for solid wastes. A Preliminary Assessment (PA) conducted by Naval Energy and Environmental Support Activity (NEESA) prior to the construction of Building 1866 concluded that unauthorized disposal occurred at the site over a 5-year period ending in 1987. The report also noted that there was no record of hazardous waste disposal, and no such disposal was recalled by facility personnel (NEESA, 1992). Based on historical ground surface topography, geophysical survey results, soil boring logs, test pit logs, and environmental sampling results, it was estimated that Site 42 contains approximately 13,310 cubic yards of landfilled material within an area of 62,290 square feet (1.43 acres) (TtNUS, 2003).

A Remedial Investigation (RI) identified localized “hot spots” containing ethyl benzene, toluene, and, xylene indicating fuel-related contaminants in subsurface soils. The analytical results show that trichloroethene (TCE) was detected in groundwater, and that toluene, bis(2-ethylhexyl)phthalate, and several pesticides were detected in subsurface soil. Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) were detected in sediment samples, along with pesticides, and some metals, including silver.

1.2.2 Site Background for Site 17

Site 17 comprises an approximately 1,000-foot stretch of Mattawoman Creek shoreline, east of the Caffee Road Landfill (Figure 1-3). The site extends inland approximately 100 feet from the shoreline into a wooded area near Building 1569. From 1969 to about 1980 metal parts and drums were disposed of in the adjacent wooded area.

An RI identified VOCs in soil and groundwater. The RI also identified the potential source: a number of discarded drums at the site. Additionally, preliminary findings of the site Ecological Risk Assessment (ERA) indicate that metals in soil may pose an unacceptable risk to ecological receptors. During the RI, ecological risks were identified in sediment and soil. Refinement of the ERA concluded that there are potentially unacceptable risks from lead, mercury and zinc in surface soil at Site 17. The United States Department of the Navy (Navy), in concurrence with the United States Environmental Protection Agency (USEPA) and the Maryland Department of the Environment (MDE), agreed to perform soil removal due to potential ecological risks from lead, mercury, and zinc in soil. Furthermore, rusted drums present at the site also will be removed. The removal of these drums will minimize the possibility that the contents of the drums are a potential source of VOC contamination to soil and groundwater. Removal of the drums will also eliminate the drums as a potential future concern or pathway for contaminant transport to the soil and groundwater. The Navy, with support from the USEPA and the MDE, agreed that a soil removal action based on appropriate Preliminary Remediation Goals (PRGs) would reduce the level of potential ecological risk at the site to acceptable levels. The established PRGs are used to determine the areas within the site that require cleanup action. The Navy had CH2MHill prepare an EE/CA to address the removal of the contaminated soil and drums.

1.3 Scopes of Work

1.3.1 Scope of Work for Site 42

The remedial activities to be performed at Site 42 include:

- Mobilization and site preparation
- Site layout and photographic documentation
- Installation of erosion and sediment controls
- Removal and relocation of utilities
- Abandonment and installation of monitoring wells

- Clearing and grubbing
- Construction of gravel access roads
- Construction of the decontamination pads
- Construction of a material handling pad and screening area
- Excavation, screening, and load-out of hazardous materials
- Field sampling and offsite analyses
- Initial grading and common fill placement
- Installation of a 40-mil linear low density polyethylene (LLDPE) cap
- Placement of cover soils
- Placement of topsoil
- Installation of a cap drain, gabion wall, and reno mattress
- Installation of an asphalt cover
- Restoration of an existing drainage channel
- Wetland mitigation
- Revegetation and planting
- Final survey.

1.3.2 Scope of Work for Site 17

The removal activities to be conducted at Site 17 include:

- Mobilization and site preparation
- Site layout and photographic documentation
- Installation of erosion and sediment controls
- Clearing and grubbing
- Construction of a material storage pad
- Construction of a decontamination pad
- Drum over packing and removal

- Excavation, screening and transportation of soils
- Field sampling and offsite analyses
- Transportation and disposal of non-hazardous debris
- Placement of backfill and topsoil
- Revegetation
- Final survey.

1.3.3 Additional Project Activities

Additional activities to be conducted for both Site 42 and Site 17 include:

- Final inspection
- Teardown and demobilization
- Contractor's closeout report.

1.3.4 Explosive Safety Submission Waivers

ESS waiver requests were reviewed by the Naval Ordnance Safety and Security Activity (NOSSA) for both Site 42 and Site 17 at NDW-IH. NOSSA waived the requirement for submission of an ESS at both Site 42 and Site 17 at this time. If live munitions are encountered during the remedial/removal activities at Site 42 or Site 17, the activities will stop at that site and an ESS will be submitted for the appropriate site. The ESS waivers for Site 42 and Site 17 are provided in Appendix H.

1.4 Project Objectives

1.4.1 Project Objectives for Site 42

The objective of the remediation at Site 42 is to:

- Prevent future residential exposure to soil and groundwater contaminants.
- Close the landfill in a manner that protects human health and the environment and controls air, water, and land pollution in accordance with state solid waste management regulations [Code of Maryland Regulations (COMAR) 26.04.07].

- Remove potential hazardous waste (hot spot) that may be a source of groundwater contamination.
- Conduct monitoring to confirm that migration of contaminants from the site has not occurred and to evaluate the need for future actions.

1.4.2 Project Objectives for Site 17

The objective of the remediation at Site 17 is to:

- Protect the environment and reduce risks to ecological receptors.
- Eliminate potential release of constituents from the drums to soil and groundwater.

1.5 Project Schedule

The Project Schedule is presented in Appendix A, which outlines the major activities to be completed at Sites 42 and 17. The work schedule for activities at Site 42 will be restricted to Fridays, Saturdays, and Sundays due to the proximity to Building 1866. Work at Site 17 will be conducted on Wednesdays and Thursdays. The description of the activities to be completed at Sites 42 and 17 is provided in Section 3.0.

2.0 Organization of Project

This section discusses labor requirements and project organization.

2.1 Labor Requirements

The proposed work requires that various crews be on site at the same time to perform the removal activities. It is estimated that separate small crews will be required for clearing and grubbing, construction of E&S controls, and excavation, screening and load out activities. Each crew will be augmented with additional personnel as necessary in order to perform the above-mentioned tasks in an efficient manner.

2.2 Management Approach to Construction

The Project Manager will work directly with the Program Manager and the Navy to achieve the Navy's satisfaction with the project. The Program Manager will have overall project responsibility to the Navy from a schedule, cost, and resources aspect. The Project Manager will be responsible for accomplishing the work according to the SOW. The Site Superintendent will report directly to the Project Manager and will be responsible for the day-to-day activities in the field. The responsibilities of the FSSI/Shaw team are:

- Prepare and submit to the Navy monthly status reports containing such information regarding percentage of completion, unresolved delays (encountered or anticipated) that may affect the schedule and a description of efforts made to mitigate those delays or anticipated delays, revise construction schedule, listing of activities scheduled for the next month, and other information relating to the progress of construction as is customary in the industry.
- If conflict, error, or discrepancy is found in contract documents, report to the Navy Technical Representative (NTR) in writing before proceeding to obtain a written interpretation or clarification from the Navy.
- Notify the NTR in writing of any subsurface or latent physical conditions encountered that differ materially from those specified or indicated.
- If materials or equipment, or specific means, methods, techniques, sequence, or procedure of construction are indicated in or required by the Project Plans, Project Specifications, or Design Drawings, furnish or utilize a substitute acceptable to the NTR if needed.
- Procure subcontractor services and submit these services to the Navy for acceptance.

- Maintain at the site two record copies of all as-built drawings, one copy of specifications, addenda, written amendments, change orders, work directive changes, field test records, field orders, and written interpretations and clarifications. Upon completion of the work, deliver these records to the Navy. At completion of the work, provide a report on the construction activities.
- Perform the remedial/removal activities defined in the Work Plan and required under this delivery order.
- Initiate, maintain, and supervise all safety precautions and programs in connection with the work.
- Provide a Site Superintendent, who will not be replaced without written notice to the Navy; the Site Superintendent will be the on site representative.
- Prepare submittals in accordance with the basic contract and Project Specifications.

2.3 Responsibilities of the Project Management Team

The remedial/removal action at Site 42 and Site 17 will be led by a project-dedicated team who will be responsible for the management and completion of the overall project. The project organization chart (Figure 2-1) defines the primary "chain of command."

The Program Manager will have the overall responsibility for project efforts including technical, schedule, and budget aspects. The Project Manager will be responsible for the day-to-day management and integration of all elements of the project and will be accountable for each activity. Supporting the Project Manager in the field will be the Site Superintendent, Site Engineer, Site Safety Officer (SSO), Project Business Administrator (PBA), and other support personnel as needed.

Separate from the project management chain of command is the QC chain of command. The Site QC Manager will report, independently of the project team, as shown on the Organizational Chart on Figure 2-1.

Responsibilities and authority of the project team and supporting field personnel fundamental to the project are discussed in the following sections.

2.3.1 Program Manager/Project Manager

The Program Manager/Project Manager as designated is the person in charge of the overall project and has full authority for coordination and direction of the project. The Program Manager/Project Manager will communicate directly with the Resident Officer in Charge of Construction (ROICC). Specific responsibilities of the Program Manager/Project Manager include:

- Approve work products, plans, and deliverables.
- Oversee the implementation of the QC Plan (Appendix G).
- Respond to resource requirements by defining resource needs and securing the commitments for staff and equipment.
- Monitor subcontractor performance, schedules, budgets, and invoices.
- Develop, review, and meet work schedule and budget objectives.
- Ensure technical adequacy of field, laboratory, data management, and construction activities.
- Prepare for and attend meetings with the Navy, as required.
- Manage and coordinate group interfaces.
- Document contract modifications, if needed.
- Approve subcontractor work and invoices.

2.3.2 Site Superintendent

The Site Superintendent is the contact at the site and will be responsible for performing the remedial/removal activities in accordance with the Work Plan and other project plans. When the Site Superintendent is not on site, the Operations Supervisor will be responsible for his duties. The Site Superintendent's responsibilities include, but are not limited to, the following:

- Implement the day-to-day aspects of the SSHSP.
- Coordinate engineering activities at the site as directed by the Site Engineer or Project Manager.
- Manage the day-to-day execution of the project at the site including administrative and procurement activities.

- Monitor work progress and schedule, and advise the Project Manager of variances.
- Implement state and federal regulations pertinent to the work.
- Prepare daily logs, which will be forwarded to the Project Manager.
- Attend work progress meetings.
- Report to the Project Manager changes desired in the Contract Documents so that required review and approval can be accomplished prior to when the change is made, and report for review and approval changes necessitated by unanticipated site conditions.

2.3.3 Site Engineer

The Site Engineer is responsible for performance of the technical aspects of the remedial/removal and construction activities. Other responsibilities include the following:

- Provide technical guidance.
- Ensure technical adequacy of field, laboratory, data management, and construction activities.
- Interface with the Project Manager for engineering activities.
- Act as a focal point for coordination of engineering project deliverables.
- Oversee site survey activities.
- Approve the appropriate project-specific procedures.
- Coordinate material purchases and specifications.

2.3.4 Site Safety Officer

The SSO is responsible for implementing the SSHSP, which satisfies federal, state, and local regulations and is consistent with site conditions. The SSO may take actions independent of the project group to stop the project, if required, for compliance with the SSHSP.

The Site Superintendent is responsible for the day-to-day implementation of the SSHSP during site activities. However, the SSO will oversee this day-to-day implementation, including the following responsibilities:

- Direct the entrance and exit medical physical requirements, if required.

- Approve personal protective equipment (PPE) and safety procedures specified in the SSHSP.
- Oversee the maintenance and use of field monitoring equipment necessary to define on site hazards associated with remediation.
- Designate appropriate PPE level; determine protection level upgrades and downgrades as site conditions permit.
- Maintain the medical and training files for the site personnel.
- Provide necessary guidance to the project staff so they can safely perform their functions in accordance with federal and state regulations.

2.3.5 Project Business Administrator

The responsibilities of the PBA are:

- Assist the Project Manager in preparation of schedules, budgets, and invoices.
- Establish tracking systems to track costs and budget variances.
- Provide weekly progress reports on budget and schedule status to the Project Manager.
- Prepare daily report deliverables.
- Audit weekly postings of charges to work budgets.
- Assist Site Superintendent in procurement activities.

2.3.6 Quality Control Manager

The Site QC Manager will be responsible for coordinating inspection and surveillance activities. The Site QC Manager will monitor the full site activities on a daily basis. The results of inspections and surveillance will be documented in a report describing the events reviewed that day. The Site QC Manager will also be responsible for the following:

- Coordinate day-to-day QC activities.
- Implement appropriate provisions of this plan.
- Serve as the collection point for remediation-related nonconformance.

- Along with the ROICC, perform a pre-construction site photographic survey and prepare an Environmental Conditions Report.
- Perform daily inspections and tests of the scope and character necessary to achieve the quality of construction outlined in the plans and specifications for work under the contract performed on or offsite.
- Perform inspections of the E&S controls weekly and after each rain event; maintain a log of E&S inspections.
- Maintain the latest applicable drawings with amendments and/or approved modifications at the job site and assure that they are used for shop drawings, fabrication, construction, inspections, and testing.
- Maintain marked-up drawings at the site depicting as-built conditions. The drawings will be available for review by the government at all times.
- Perform all sampling activities in accordance with the approved protocols. Navy quality assurance (QA) procedures are the approved protocols for this Project.
- Hold and preside over bi-weekly quality review meetings of the site work being performed, and review proposed work procedures and type of work scheduled.
- Maintain a contractor-generated submittal register, ENG Form 4288, for the duration of the contract. A review of the register will be performed at least every 14 days in conjunction with the scheduled dates on the register and in relation to the actual work status. Appropriate actions will be undertaken in the event that slippages or other changes occur.
- Review shop drawings and/or other submittals for compliance with the contract requirements prior to their transmission to the government.
- Establish and maintain a Rework Items List of work that does not conform to specifications. Track and monitor the items on the list to assure the rework inspection and testing activities and frequencies are in accordance with the contract requirements.
- Attend and assist the government at the prefinal inspection and the final acceptance inspection.
- Conduct inspections of the haul trucks and manifest documentation prior to their leaving the site.

- Confirm the quality and quantity of materials delivered to the site as referenced by the project drawings.
- Prepare a photo log to document daily site activities.

3.0 Description of Activities

This section discusses the major field activities associated with the remedial/removal actions to be performed at Site 42 and Site 17. These activities are listed in Section 1.3 of this Work Plan, and a Project Schedule is presented in Appendix A of this Work Plan. The activities described below are in sequential order; however, field conditions, weather, and/or client direction may alter the sequencing of these activities.

3.1 Site 42 Remedial Activities

3.1.1 Mobilization and Site Preparation

Upon completion of the Pre-Construction Conference and the approval of this Work Plan, FSSI/Shaw will proceed with the mobilization of personnel and equipment from Shaw's resource facilities located in Windsor, New Jersey and Tidewater, Virginia. The additional project needs and logistics will be coordinated through FSSI's Ellicott City, Maryland office and Shaw's Monroeville, Pennsylvania office. Unexploded Ordnance (UXO) specialists will be mobilized from other Shaw regional or divisional offices, as required. Additional rental equipment and material resources will be obtained from local vendors.

Initially, FSSI/Shaw will mobilize several employees to begin site setup activities. The main project office for the work at the site will be located off-base because of the criticality of the work being performed within and in the vicinity of Building 1866, and the availability of utility service. FSSI/Shaw will mobilize one office trailer to Site 42 to accommodate the project management personnel. Site 42 will also have a break trailer for the crew and a storage trailer for equipment and supplies. A local subcontractor will be utilized to connect power to the trailers.

At least seven (7) days prior to performing work at the site, Shaw will submit draft copies of the FSSI/Shaw's internal Excavation Permit to the Public Works Officer, Utilities Division. FSSI/Shaw will work with the Public Works Officer to confirm/identify all underground and/or overhead utilities locations on site. In addition, Miss Utility of Maryland (800) 257-7777 will be contacted prior to any intrusive activities. FSSI/Shaw will also provide any additional notifications and/or permit applications identified by the ROICC and/or Base Officers. Locations of any underground utilities will be identified and marked prior to any ground disturbance.

Site controls will consist of perimeter signs which will be installed at 100-foot centers along the perimeter of the site as directed by the Contracting Officer. The signs will conform to the Language shown on Details 1 and 4 of Sheet C-10 of the Design Drawings (Appendix C), and Section 10401 – “Signage” of the Project Specifications (Appendix B).

A sign that conforms to Navy requirements for project identification will be installed at the entrance to Site 42. Olsen Road will be the main entrance for Site 42 and general means of site ingress/egress for all personnel and deliveries. In addition, temporary security fence, consisting of orange construction fence, attached to metal “T” posts will be installed near Building 1866 to restrict access to the site during construction operations.

3.1.2 Site Layout and Photographic Documentation

During site setup, a subcontracted survey crew will begin layout of the features indicated on Sheet C-2 of the Design Drawings (Appendix C). FSSI/Shaw will establish grade control in the work area using existing survey monuments. Using the Design Drawings (Appendix C), the surveyor will stake the locations of the following work items:

- Base line
- Limits of disturbance
- Silt fence location
- Access road location
- In-stream stone dike
- Area of potential hazardous waste
- Limits of geomembrane cap
- Limits of asphalt cover.

Survey support will be used to layout the grading plan and to guide the regrading of waste to the lines and grades shown on the interim grading plan on Sheet C-6 of the Design Drawings (Appendix C). An as-built survey of the interim grading layer will be completed prior to the start of the geomembrane installation.

FSSI/Shaw will photograph the site during the initial mobilization prior to the start of any significant ground-disturbing activities, as part of the Environmental Conditions Report. Additional photographs will be taken during the implementation of all tasks to document construction operations.

3.1.3 Erosion and Sediment Control Installation

This section describes the various temporary erosion and sediment controls that will be used during earth moving activities at the site. All erosion and sediment controls will comply with the manufacturer's installation specifications, the 1994 Standards and Specifications for Soil Erosion and Sediment Control, MDE requirements, the Project Specifications (Appendix B), and the ESCP Amendment (Appendix D). All erosion and sediment control features will be installed under the direction of the Site Supervisor and will remain in-place until the site is vegetated and approval is received from the ROICC.

3.1.3.1 Stone Check Dams

Stone check dams conforming to Detail 6 on Sheet C-5 will be constructed in the locations shown on Sheet C-2 of the Design Drawings (Appendix C). Heavy equipment such as an excavator will be utilized for the installation of the stone check dams.

3.1.3.2 Portable Sediment Tanks

Portable sediment tanks will be installed as needed for dewatering at locations determined by the Contractor. These tanks will be installed in accordance with the notes on Sheet C-3 and Detail 5 on Sheet C-5 of the Design Drawings (Appendix C).

3.1.3.3 Silt Fencing

Prior to any earth disturbance, silt fence will be installed in the locations shown on Sheet C-2, and in accordance with the notes on Sheet C-3, and Detail 2 on Sheet C-5 of the Design Drawings (Appendix C).

3.1.3.4 Super Silt Fencing

Prior to any earth disturbance, super silt fence will be installed at the locations shown on Sheet C-2, and in accordance with the notes on Sheet C-3 and Detail 1 on Sheet C-5 of the Design

Drawings (Appendix C). At a minimum, silt fencing will be installed on all downslope sides of fill placement areas.

3.1.3.5 Stabilized Construction Entrances

Stabilized construction entrances will be installed to reduce the amount of soil transported onto paved roads by motor vehicles or runoff. These stabilized construction entrances will consist of a stone pad underlain with a layer of filter fabric and will be constructed at all points of vehicular ingress or egress. The construction entrances will be installed, at a minimum, in the locations shown on Sheet C-2 and in accordance with the notes on Sheet C-3 and Detail 3 on Sheet C-5 of the Design Drawings (Appendix C). Heavy equipment such as an excavator will be utilized for the installation of the construction entrance. New stone will be added as necessary or soil covering the stone will be washed off, so that the stone at the entrance will aid in removing soil from vehicle tires.

3.1.3.6 Temporary Access Culverts

Temporary access culverts will be installed as needed and at the locations Shown on Sheet C-2. These culverts will be installed in accordance with the notes on Sheet C-3 and Detail 4 on Sheet C-5 of the Design Drawings (Appendix C).

3.1.3.7 Erosion Control Matting

Permanent erosion control matting will be installed in the locations shown in Details 5, 6, and 8 on Sheet C-9 and in Details 5 and 8 on Sheet C-10 of the Design Drawings (Appendix C). The matting will be installed in accordance with the approved ESCP Amendment (Appendix D) and the manufacturers' instructions.

3.1.3.8 Temporary Seeding

Temporary seeding will be performed on all areas which will remain dormant for the slopes and times designated in 02953 – “Trees, Shrubs, Plants, and Grass” of the Project Specifications (Appendix B). The temporary seed mixture and application rate will be in accordance with Sheet C-4 of the Design Drawings (Appendix C).

3.1.3.9 Permanent Seeding

Permanent seeding will be performed in accordance with 02953 – “Trees, Shrubs, Plants, and Grass” of the Project Specifications (Appendix B). The permanent seed mixture and application rate will be in accordance with Sheet C-4 of the Design Drawings (Appendix C).

3.1.3.10 Mulching

All seeded areas will be mulched as designated in Section 02953 – “Trees, Shrubs, Plants, and Grass” of the Project Specifications (Appendix B) and Sheet C-4 of the Design Drawings (Appendix C).

3.1.3.11 Surface Roughening

All disturbed areas which are to receive temporary or permanent seeding will be roughened to reduce runoff velocities and to provide a suitable seed bed.

3.1.3.12 In-Stream Stone Dike

A stone dike will be constructed in the location shown on Sheet C-2 and in accordance with Detail 7 on Sheet C-5 of the Design Drawings (Appendix C), and the ESCP Amendment (Appendix D). The dike will be constructed with Class I rip rap, with a weir constructed by placing a single layer of Class PE geotextile covered with 2-inch angular stone. Shaw may alternatively construct the in-stream stone dike with gabion baskets. Heavy equipment such as a hydraulic excavator will be utilized to construct the in-stream stone dike. The decision to use gabion baskets will be made by the Site Superintendent.

3.1.4 Utility Removal and Relocation

Prior to commencing cap construction activities, it will be necessary to perform the following utility work:

- Abandonment in-place of an existing 8-inch diameter River Water Line.
- Installation of 250 linear feet of 8-inch diameter polyvinyl chloride (PVC), American Water Works Association (AWWA) C900, Pressure Class 200 pipe and associated fittings.
- Remove and relocate one existing fire hydrant, and install bollards.
- Relocate/install fire alarm accessories.

All utility removal and relocation activities will be performed in accordance with Section 02510N – “Water Distribution” of the Project Specifications (Appendix B) and Sheets C-13 and C-14 of the Design Drawings (Appendix C). FSSI/Shaw will subcontract the utility work to a local utility contractor.

3.1.5 Monitoring Well Abandonment and Installation

Three existing monitoring wells (S42MW02, S42MW04 and S42MW07) will be abandoned as part of the Site 42 remedial activities. In order to maintain the requirements of the post-closure ground water monitoring program, three additional wells (S42MW11, S42MW12 and S42MW13) will be installed in the locations shown in Sheet C-7. All monitoring well abandonment and installation will be performed in accordance with the Section 02525N – “Monitoring Wells” of the Project Specifications (Appendix B) and Detail 2 on Sheet C-10 of Design Drawings (Appendix C) as well as with COMAR 26.04.04 for Well Construction. All work and reporting will be performed by a subcontracted well driller licensed by the Maryland State Board of Well Drillers.

3.1.6 Clearing and Grubbing

FSSI/Shaw will self-perform the clearing at Site 42. All trees, shrubs, and stumps within the limits of disturbance, as shown on Sheet C-3 of the Design Drawings (Appendix C), will be cut to the ground surface. Matted roots and roots over 2-inches in diameter will be removed to a depth of 18-inches, unless otherwise indicated. All stumps will be removed. The cleared and grubbed materials will be chipped and/or transported for off-base disposal. All clearing and grubbing will be performed in accordance with Section 02315N – “Excavation and Fill” of the Project Specifications (Appendix B).

3.1.7 Gravel Access Road Construction

Two gravel access roads will be constructed to assist in the placement and hauling of material at the locations shown on Sheet C-2. The access roads will consist of Maryland State Highway Administration (MDSHA) graded aggregate and an MDE Application Class PE geotextile underliner in accordance with Detail 3 on Sheet C-10 of the Design Drawings (Appendix C). Heavy equipment such as an excavator and/or dozer will be utilized for the placement of the aggregate. The northern road will be removed at the completion of topsoil placement to allow for the installation of a fire hydrant.

3.1.8 Decontamination Pad Construction

Three temporary decontamination pads will be constructed at Site 42. Two pads will be located at the main Site 42 area, and one will be located within the material handling pad. The decontamination pads will be constructed with wooden timbers and visqueen and will drain to a sump area, where a submersible pump will be installed. Water collected in the decontamination pad will be containerized and sampled for off-base disposal at an approved facility.

3.1.9 Material Handling Pad Construction

A material handling pad consisting of a decontamination area and a screening area will be constructed outside the explosive arc limits of Building 1866, as shown on Sheet C-2 of the Design Drawings (Appendix C). Construction beyond these limits will allow for material handling and screening activities to occur outside the normal work week of Friday through Sunday.

The material handling area will measure 170-feet by 120-feet. This area will consist of a geomembrane lined screening area and separate stockpile areas for screened and unscreened materials, and reject materials. The pad will be constructed by excavating a minimum of 6-inches of existing soil from the area and utilizing this material to construct 2-foot tall soil berms around the area. The geomembrane will be placed over the soil berms and will be held in place with sand bags. The geomembrane will be covered with a 6-inch layer of sand. Visqueen will be used to cover both the screened and unscreened soil stockpiles. The base of the material handling will be sloped to a collection point where a submersible pump will be used to collect any water. All collected water will be sampled prior to off-base disposal at an approved facility. The material handling pad will be constructed in accordance with Detail 2 shown on Sheet C-11 of the Design Drawings (Appendix C).

A screening plant will be placed at the handling area. The screening plant will be used to remove any large debris from the excavated soil.

3.1.10 Potential Hazardous Material Excavation, Screening, and Load-out

The excavation of hazardous materials will occur at two locations within Site 42. The first location is delineated on Sheet C-2 of the Design Drawings (Appendix C) as an area of potential hazardous waste. The second location is an area of impacted sediment along the stream channel.

Approximately 1,200 cubic yards of soil/debris will be excavated from the area of potential hazardous materials using a hydraulic excavator. The excavation will be a maximum of 3-feet deep and will be performed prior to the start of waste regrading activities. The excavated material will be transported to the materials handling pad, screened, sampled and disposed off-base at an approved disposal facility. Confirmation sampling will be performed at the base of the excavation by the Navy. FSSI/Shaw will wait to receive approval from the ROICC before covering this area with select landfill material.

Approximately 430 cubic yards of impacted sediment will be removed from the stream channel to a depth of 2-feet. The excavated material will be placed on the landfill and allowed to dry before hauling to the material handling pad. The sediment material will be sampled and disposed of at an approved off-base disposal facility. A hydraulic excavator and a bulldozer will be utilized to perform this task.

As a result of site conditions, identification and screening of munitions and explosives of concern (MEC) will occur in several steps. First, UXO technicians will observe the excavation activities to determine if any MEC are present. Second, UXO technicians will monitor the screening of the excavated materials at the materials handling pad. Should suspect MEC items be observed in the excavator bucket, within the excavation area, or at the material handling pad, excavation and screening operations will immediately cease. The cease work signal will be given by the UXO technicians or the equipment operators. Once non-essential personnel have been evacuated to a safe distance outside the exclusion zone, an evaluation of suspect item(s) will occur.

The UXO technicians will remain onsite on a full-time basis during all intrusive site activities. The UXO technicians will conduct visual inspections and monitoring prior to each ground-disturbing activity performed by FSSI/Shaw. All UXO work will be performed in accordance with Navy-approved UXO protocols and the SSHSP which is presented in Appendix F of this Work Plan.

The UXO team will be comprised of a minimum of two Shaw UXO technicians qualified in accordance with DoD Explosives Safety Board (DDESB) Technical Paper (TP) 18. At a minimum, the team will have a Senior UXO Supervisor (SUXOS) and a UXO Technician I.

3.1.11 Field Sampling and Offsite Analyses

Descriptions of the field sampling and offsite analyses are presented in Section 4.0 of this Work Plan.

3.1.12 Initial Grading and Common Fill Placement

The following sections discuss the initial grading and placement of the common fill layer.

3.1.12.1 Topsoil Stripping

All topsoil within the limits of disturbance but beyond the limits of the landfill will be stripped to a depth of 6-inches with a CAT D6 low ground pressure (LGP) or equivalent bulldozer and stockpiled for reuse during site restoration activities.

3.1.12.2 Waste Regrading

Approximately 5,000 cubic yards of existing waste/debris/soil will be regraded. The regraded waste will conform to the grades shown on Sheet C-6 of the Design Drawings (Appendix C). A portion of the regrading work will occur around and under the existing steam line. This work will require caution to prevent damaging the existing steam line which must remain in service during the entire project. The steam line is mounted on 18 to 24-inch concrete piers. Hand shoveling may be required to clear soil/waste away from the concrete. The regraded waste will form an interim grading layer which will then be covered with a minimum of a 6-inch thick layer of common fill to create a base for the geomembrane installation.

A Cat D6 or equivalent bulldozer will be utilized to regrade the waste material. Survey support will be used to monitor the waste/debris placement. Prior to any placement of fill material, waste, select landfill material or common fill, the areas will be proof-rolled with a minimum of four passes of a Cat CS563 vibratory roller or equivalent and no compaction testing will be required. The select fill material will be placed in a maximum 8-inch loose lift and compacted with a minimum of four passes of a Cat CS563 vibratory roller or equivalent. Approximately 990 cubic yards of excess material from the waste regrading will be transported to the materials handling pad for screening and off-base disposal. The material is considered to be non-hazardous and will be sampled and disposed of accordingly at an approved disposal facility.

3.1.12.3 Common Fill Placement

The select fill material will be covered with 6 inches of compacted common fill. The common fill will be direct placed by the dump trucks and will be spread in maximum 6-inch loose lifts by a Cat D6 LGP or equivalent bulldozer. A Cat CS563 vibratory roller or equivalent compactor will compact the common fill to a minimum of 90 percent of the maximum dry density based on American Society for Testing and Materials (ASTM) Method D698.

3.1.13 Cap Drain Installation

Initial construction on the cap drain will occur during the waste regrading and fill placement activities, and will consist of forming a v-shaped channel along the alignment shown on Sheets C-6 and C-7 of the Design Drawings (Appendix C). An excavator with a swiveling bucket or a bulldozer will be utilized to create the v-shaped channel shown in Detail 6 on Sheet C-10 of the Design Drawings (Appendix C). Cap drain construction will be completed after the completion of geomembrane installation with the installation of a 4-inch diameter corrugated perforated pipe bedded in American Association of State Highway and Transportation Officials (AASHTO) #67 coarse aggregate being installed into the v-shaped channel. The aggregate will be covered by a single sheet of separation geotextile. The cap drain will be constructed as shown in Detail 6 on Sheet C-10 of the Design Drawings (Appendix C).

3.1.14 Geomembrane Cap Installation

A geomembrane cap consisting of a 40-mil LLDPE liner covered by a double-sided composite drainage layer will be installed to the limits shown on Sheet C-7 and the details shown on Sheets C-9 and C-10 of the Design Drawings (Appendix C). Shaw will subcontract the installation of the geosynthetics. The installer will be responsible for performing the pre-construction and as-placed quality control tests required in Section 02372a – “Waste Containment Geomembrane”, Section 02373 – “Geotextile”, and Section 02374a – “Geosynthetic Drainage Layer” (Appendix B). The installation of the geomembrane will also occur around and under the steam line. Geomembrane boots conforming to Detail 7 on Sheet C-10 will be installed around the concrete piers.

3.1.15 Select Fill Placement

Approximately 5,100 tons of select fill will be placed over the geomembrane and compacted to 6-inches below the lines and grades shown on Sheet C-7 of the Design Drawings (Appendix C). The select fill will consist of clayey sand (SC), clayey silt (CL-ML), or silty clayey sand (SC-

SM). The select fill will be obtained from an approved offsite borrow source and hauled to the site by over-the-road dump trucks. Samples of the fill material will be obtained for geotechnical testing at the frequencies detailed in Section 02315N – “Excavation and Fill” of the Project Specifications (Appendix B). Imported soil will be sampled and analyzed for conformance to the requirements of Table 1 of the same section. The select fill will be direct-placed by the dump trucks and will be spread in maximum 8-inch loose lifts by a Cat D6 LGP or equivalent bulldozer.

A Cat CS563 or equivalent compactor will compact each soil lift to a minimum of 85 percent of maximum dry density based on ASTM Method D698. A maximum of three lifts (18 inches of compacted fill) will be placed and compacted to 6-inches below the lines and grades shown on Sheet C-7 of the Design Drawings (Appendix C). A Shaw technician will monitor compaction with a Troxler Nuclear Density Gauge. Compaction testing will be performed at the frequencies described in Section 02315N – “Excavation and Fill” of the Project Specifications (Appendix B). The elevation of the select fill layer will be monitored by a Shaw surveyor during placement activities. The Navy will be provided with a copy of the current instrument calibration for the Troxler Nuclear Density Gauge and the technician’s operator certification will be kept on file at the onsite project trailer.

3.1.16 Topsoil Placement

Once the area is backfilled with select fill, Shaw will begin placement of the topsoil and final grading of the site. Approximately 1,500 tons of topsoil will be placed to create a minimum 6-inch thick topsoil layer on top of the select fill layer. The topsoil will be placed and spread to the lines and grades shown of Sheet C-7 of the Design Drawings (Appendix C).

Topsoil will be obtained from an approved offsite borrow source and will be tested prior to its use on site. All material to be used as topsoil will be tested for gradation, organic matter, pH, soluble salts as detailed in Section 02953 – “Trees, Shrubs, Plants, and Grass”, and the chemical constituents detailed in Table 1 of Section 2315N - “Excavation and Fill” of the Project Specifications (Appendix B).

Placement of the topsoil layer will begin immediately upon completion of the select fill layer. A Cat D6 LGP bulldozer will be utilized to place the material in one 6-inch thick lift. The compaction of this layer will be incidental to the placement of the soil and tracking of the

equipment. The topsoil layer will not be spread or placed when the underlying fill is frozen or excessively wet. All irregularities in the finished surface will be corrected to eliminate depressions prior to seeding.

3.1.17 Asphalt Cover Installation

The following sections discuss the installation of an asphalt cover over an area of approximately 5,200 square feet, adjacent to Building 1866.

3.1.17.1 Subgrade Preparation

Subgrade preparation for the asphalt cover will consist of the installation of a single layer of cushion geotextile over the 40-mil LLDPE geomembrane. Next a 6-inch lift of CR6 coarse aggregate will be installed and compacted to 70 percent of relative density in accordance with ASTM D4253 and ASTM 4254.

3.1.17.2 Asphalt Installation

FSSI/Shaw will subcontract the installation of the asphalt. The subcontractor will install the two layers of asphalt shown in Detail 1 on Sheet C-9 of the Design Drawings (Appendix C) and the asphalt curbing shown on Detail 7 of the same sheet. The asphalt will be installed in accordance with the requirements of Section 02742N – “Pavement with a Bituminous Concrete Surface” of the Project Specifications (Appendix B). The subcontractor will perform the field testing detailed in part 3.10 of the specification.

3.1.18 Existing Drainage Channel Restoration

Drainage ditch/channel restoration will consist of the placement of reno mattresses and gabion baskets along the southern perimeter of the site and within the drainage channel. In addition bare root plants will be placed within selected locations as required as part of the wetland mitigation. Plantings are further discussed in Section 3.1.19.2 of this Work Plan.

Gabion baskets and reno mattresses will be placed in the locations shown on Sheets C-6 and C-7 of the Design Drawings (Appendix C) and constructed in accordance with Detail 5 on Sheet C-9 and Details 5 and 8 on Sheet C-10. Reno mattresses will be installed along the southern perimeter of the landfill and in the base of the drainage channel and the unnamed stream. The reno mattresses will act as a solid base for the gabion baskets. Gabion baskets will be used as a

buttress along the perimeter of the site and as protection against erosive forces from surface water contact. The reno mattress will be constructed by first removing soft sediments from the toe of the landfill slope. A single layer of separation geotextile will be placed, and then the empty mattress will be placed and filled with 4 to 7-inch angular stone. Separation geotextile will only be placed under the mattress in the drainage channel. Hog rings will be used to fasten the lid of the mattress to the sides and to attach the mattresses to one another. Once the mattresses are all connected, the empty Gabion baskets will be placed and filled with 4 to 7 inch angular stone. Once again hog rings will be used to fasten the lid to the sides and the baskets to one another. Class I rip rap will be placed along the base of the gabion baskets on the face side along the southern and eastern perimeter of the landfill as shown on Detail 5 on Sheet C-9 of the Design Drawings (Appendix C).

3.1.19 Wetland Mitigation

The wetlands creation plan includes placement of topsoil, and vegetation (trees, shrubs, and grass seed) within the limits of the wetland area as presented on Sheet C-12 of the Design Drawings (Appendix C). In addition, a maintenance program will be implemented on the wetland mitigation area to check the status of the vegetation and side slopes.

3.1.19.1 Topsoil Placement for Wetlands

Topsoil will be placed to the grades shown in Details 1 and 2 of Sheet C-12 on the Design Drawings (Appendix C). Topsoil will be brought to the site from an offsite source. Approximately 130 cubic yards of topsoil will be placed. Offsite topsoil will be tested to verify that it conforms to Section 02315N – “Excavation and Fill” of the Project Specifications (Appendix B). Trucks will deliver the topsoil to a staging area designated on site and stockpiled. The topsoil will be enhanced with additional organic material, as necessary to meet the Project Specifications (Appendix B). The organic material from an offsite source will be incorporated into the topsoil with a front-end loader during the staging process. The topsoil will be loaded from the staging area and transported by dump truck to the wetland mitigation area. The topsoil will be placed with a long reach excavator as the excavation progresses across the site. The topsoil will be placed in a single 6-inch loose lift. No compaction of the topsoil will be completed. The topsoil layer will take the shape of the top of excavation.

3.1.19.2 Wetlands Planting

Prior to planting of the trees, shrubs, and grass seed within the wetland mitigation area, soil amendment (i.e. lime, and fertilizer) will be added to the topsoil based on agronomic test results for a representative sample of the material. The planting activities will be completed for six separate zones as identified on Sheet C-12 of the Design Drawings (Appendix C). The layout of the plants and the limits of each zone will be staked or flagged for approval by the ROICC and the Installation Natural Resources Manager before planting is initiated. All plants will be installed in accordance with Specification Section 02953 – “Trees, Shrubs, Plants, and Grass”, and the supplier’s recommendations.

The six planting zones identified within the wetlands mitigation area will be vegetated in accordance with the planting schedules provided on Sheet C-12 of the Design Drawings (Appendix C). The areas to be vegetated outside the wetlands mitigation area will be seeded using the Permanent and Temporary Seeding Summary provided on Sheet C-4 of the Design Drawings (Appendix C). The seedbed preparation information for permanent seeding will be completed per the notes provided on Sheet C-4 of the Design Drawings (Appendix C). It is anticipated that hydroseeding will be used for ground stabilization to promote quick germination of the seed and establish vegetative cover to reduce maintenance problems. FSSI/Shaw will contact the ROICC for an appropriate water source. The seedbed will be moistened prior to seed application. Wood cellulose fiber mulch will be used in conjunction with hydroseeding.

3.1.19.3 Wetlands Maintenance Program

The maintenance program for the wetland mitigation area will consist of monthly inspections performed by FSSI/Shaw until ten (10) weeks after formal acceptance by the Contracting Officer is received. Maintenance will consist of watering activities and other necessary operations adequate to insure the survival of the planted materials for the duration of the maintenance period. All dead plants will be removed and replaced during this period.

3.1.20 Re-vegetation and Planting

Upon completion of the soil placement activities, all disturbed areas will be fine graded and re-seeded. The purpose of this activity is to restore the area to as natural a condition as practical, to encourage the growth of natural flora, and to minimize environmental damage during the post-construction period.

FSSI/Shaw will subcontract the seeding and mulching activities. Seed and mulch will be applied to all disturbed areas. The seed mixture will consist of 20 pounds per acre of perennial rye grass and 20 pounds per acre of flatpea.

Erosion control matting will be installed at the locations shown in Details 5, 6, and 8 on Sheet C-9 and in Details 5 and 8 on Sheet C-10 of the Design Drawings (Appendix C).

3.1.21 Final Survey

A final topographic survey will be performed by a FSSI/Shaw subcontracted surveyor upon completion of the low permeability soil cap installation. The data from the survey will be used subsequently to prepare as-built drawings of the completed site. A Professional Surveyor registered in the State of Maryland will prepare a plat map of the site showing the location of key installed features and limits of the geomembrane cap and asphalt cover.

3.2 Site 17 Removal Activities

Removal activities at Site 17 will consist of the excavation and removal of approximately 420 cubic yards of soil and the removal of approximately 30 drums that are in a disintegrated condition. The following sections describe the removal activities that will occur at Site 17.

3.2.1 Mobilization and Site Preparation

Mobilization and site preparation activities for Site 17 will be concurrent with those activities for Site 42, which are described in Section 3.1.1 of this Work Plan.

3.2.2 Site Layout and Photographic Documentation

Site layout activities and photographic documentation for Site 17 will be similar to those described for Site 42, which are presented in Section 3.1.2 of this Work Plan, except that all surveying activities will be performed by FSSI/Shaw.

3.2.3 Erosion and Sediment Control Installation

This section describes the various temporary erosion and sediment controls that will be used during drum removal and earth moving activities at Site 17. An ESCP Amendment has been prepared for review by MDE. This ESCP Amendment utilizes much of the components presented in the reviewed ESCP Amendment for Site 42 that is presented as Attachment 1 to the

ESCP Amendment (Appendix D). All erosion and sediment controls will comply with the manufacturer's installation specifications, the 1994 Standards and Specifications for Soil Erosion and Sediment Control, MDE requirements, the Project Specifications (Appendix B), and the ESCP Amendment. All E&S control features will be installed under the direction of the Site Supervisor and will remain in-place until the site is vegetated and approval is received from the ROICC.

3.2.3.1 Portable Sediment Tanks

Portable sediment tanks will be installed as needed for dewatering at locations determined by the Contractor. These tanks will be installed in accordance with the notes on Sheet C-3 and Detail 5 on Sheet C-5 of the Design Drawings (Appendix C).

3.2.3.2 Silt Fencing

Prior to any earth disturbance, silt fence will be installed at the locations shown in the ESCP Amendment (Appendix D), and in accordance with the notes on Sheet C-3 and Detail 2 on Sheet C-5 of the Design Drawings (Appendix C). At a minimum, silt fencing will be installed on all downslope sides of disturbed areas.

3.2.3.3 Stabilized Construction Entrance

A stabilized construction entrance will be installed to reduce the amount of soil transported onto paved roads by motor vehicles or runoff. The stabilized construction entrances will consist of a stone pad underlain with a layer of filter fabric and will be constructed at all points of vehicular ingress or egress. The construction entrance will be installed at the location shown in Figure 1 of the ESCP Amendment (Appendix D). Heavy equipment such as an excavator will be utilized for the installation of the construction entrance. New stone will be added as necessary or soil covering the stone will be washed off, so that the stone at the entrance will aid in removing soil from vehicle tires.

3.2.3.4 Earth Dikes

Two earth dikes will be constructed in accordance with Detail 1 and in the locations shown in Figure 1 of the ESCP Amendment (Appendix D). The earth dikes will be Type A-2, lined with erosion control matting. Heavy equipment, such as an excavator or bulldozer, will be utilized for the construction of the earth dikes.

3.2.3.5 Temporary Seeding

Temporary seeding will be performed on all areas which will remain dormant for the slopes and times designated in Section 02953 – “Trees, Shrubs, Plants, and Grass” of the Project Specifications (Appendix B). The temporary seed mixture and application rate will be in accordance with Sheet C-4 of the Design Drawings (Appendix C).

3.2.3.6 Permanent Seeding

Permanent seeding will be performed in accordance with Section 02953 – “Trees, Shrubs, Plants, and Grass” of the Project Specifications (Appendix B). The permanent seed mixture and application rate will be in accordance with Sheet C-4 of the Design Drawings (Appendix C).

3.2.3.7 Mulching

All seeded areas will be mulched as designated in Section 02953 – “Trees, Shrubs, Plants, and Grass” of the Project Specifications (Appendix B) and Sheet C-4 of the Design Drawings (Appendix C).

3.2.3.8 Surface Roughening

All disturbed areas which are to receive permanent seeding will be roughened to reduce runoff velocities and to provide a suitable seed bed.

3.2.3.9 Erosion Control Matting

Erosion control matting will be installed on the two earth dikes as shown in Detail 1 on Figure 1 of the ESCP Amendment (Appendix D). The matting will be installed in accordance with manufacturer’s instructions.

3.2.4 Clearing and Grubbing

Minimal clearing and grubbing will be necessary to access the soil removal areas and drum areas at Site 17. Small trees and limbs will be chipped, larger trees and stumps will be removed and hauled off-base to an approved facility. The limits of disturbance are shown on Figure 1 of the ESCP Amendment (Appendix D).

3.2.5 Decontamination Pad Construction

One temporary decontamination pad will be constructed within the limits of Site 17 and one will be constructed at the Caffee Road Landfill (Site 11) as per Section 3.2.5.6. The decontamination pad will be constructed with wooden timbers and visqueen and will drain to a sump area where a submersible pump will be installed. Water collected in the sump will be contained and sampled for disposal at an off-base approved facility.

3.2.6 Material Storage Pad Construction

A material storage pad consisting of a decontamination area, a screening area, and a storage area will be constructed at the Caffee Road Landfill (Site 11) at a location approved by the ROICC. The decontamination pad will be constructed as mentioned in Section 3.2.5. The material storage area will consist of a bermed polyethylene lined pad. Imported common fill, obtained from an approved source, will be used to construct the berms. Once all of the screened soils from the Site 17 excavations have been placed within the material storage pad, a polyethylene liner will be installed over the stockpile. Staked hay bales will be used to hold the liner in-place.

3.2.7 Drum Removal

Three areas of the site contain approximately 30 drums that are in a disintegrated condition. (Figure 1 of the ESCP Amendment, Appendix D). These include two areas located within the “Southwest Area” and one area in the central part of the site. If any whole drums are found during the removal activity, they will be over packed and staged within the Site 17 drum removal areas. In areas where disintegrated drums are found, excavation will be conducted to a depth of 24-inches in order to remove the buried drums.

3.2.8 Soil Excavation, Transportation and Screening

Prior to the start of excavation activities, orange hi-visibility fencing will be installed around the perimeter of the proposed excavation areas. A hydraulic excavator will be used to remove approximately 400 bank cubic yards of soil from the “Southwest Area” and approximately 20 bank cubic yards of soil from the “Northeast Area” (Figure 1 of the ESCP Amendment, Appendix D). The Southwest and Northeast areas will be excavated to a depth of 12-inches.

The excavated soil will be loaded into dump trucks and transported to the material handling pad at Site 11. The UXO Technicians will monitor the screening process to identify any potential

MEC as described in Section 3.1.10 of this Work Plan. Following soil excavation activities, and upon approval, FSSI/Shaw will backfill the excavation with “clean” soil.

3.2.9 Field Sampling and Offsite Analyses

Descriptions of the field sampling and offsite analyses are presented in Section 4.0 of this Work Plan.

3.2.10 Backfill and Topsoil Placement

“Clean” soil will be obtained from an approved source and will be placed in the excavation in 8-inch loose lifts and compacted with 4 passes of a CAT CS563 vibratory roller or equivalent, no compaction testing will be performed. A single 6-inch lift of topsoil will then be placed over the excavated areas.

3.2.11 Re-vegetation

Upon completion of the backfill activities, all disturbed areas will be fine graded and re-seeded. The purpose of this activity is to restore the area to as natural a condition as practical to encourage the growth of natural flora and to minimize environmental damage during the post-construction period.

Seed and mulch will be applied to all disturbed areas. The seed mixture will consist of 20 pounds per acre of perennial rye grass and 20 pounds per acre of flatpea.

3.2.12 Final Survey

A final topographic survey will be performed by FSSI/Shaw upon completion of the backfill activities. The data from the survey will be used subsequently to prepare as-built drawings of the completed site.

3.3 Teardown and Demobilization

This section presents the activities associated with the completion of remedial activities.

3.3.1 Temporary Erosion Control Removal

Upon completion of cap construction activities, the temporary controls will be removed and disposed offsite at a municipal landfill. All earth dikes will be graded to meet surrounding areas

to meet surrounding grades and all disturbed areas will be reseeded. The silt fence will be removed after vegetation is established and approval is received from the ROICC. All silt fencing will also be disposed off-base at an approved facility.

3.3.2 Demobilization

At the completion of all construction activities at Site 42 and Site 17, and upon approval from the Navy, FSSI/Shaw will officially demobilize from the site.

3.4 Final Inspection

Final acceptance of the completed project will be based upon a final inspection of the project site. The inspection will occur after the vegetation has been established and approval from the ROICC has been received. The Navy will be given a minimum of seven days advanced notice of the inspection. The inspection will be conducted by the Site QC Manager and the Site Superintendent. The Site QC Manager will maintain a punch list of items that remain to be completed, discovered during the inspection.

An ongoing rework items list will be kept to track and record actionable corrections recorded during the life of the project. The daily production and quality control reports will track variances and actions to be taken to correct the rework list items. After the rework list has been completed, the Navy will be offered another opportunity to inspect these items before FSSI/Shaw demobilizes from the site. The purpose of this inspection is to verify that all the tasks identified on the punch list and all tasks detailed in the contract have been completed to the Navy's satisfaction such that the ROICC will sign off on the completion. At the completion of this last inspection, there should be no incomplete or unacceptable work remaining. The completion of this task should constitute final acceptance of the project.

3.5 Contractors Closeout Report

FSSI/Shaw will prepare a draft Contractors Closeout Report under separate cover and will produce a final approved Closeout Report within 60 days of receipt of all comments. The official completion date will occur on the date when an acceptance letter is transmitted by the NTR.

The Closeout Report will present a text narrative describing the details of the remedial/removal action work, in accordance with Section 01115N – “General Paragraphs (Remedial Action Contracts)” on the Project Specifications (Appendix B).

4.0 Field Sampling and Analysis

This section discusses the sampling and analysis activities associated with the remedial/removal activities at Site 42 and Site 17. Several site activities will require sampling and analysis as identified below.

- **Waste Characterization Sampling:** Representative samples of the hot spot excavation at Site 42, stream sediment at Site 42, soil/debris from waste regrading, and any drums removed from Site 17 that contain material will be submitted to an offsite laboratory for characterization. The results will then be used to prepare the waste profiles for disposal. In addition, specialized waste may be excavated which may require separate waste characterization such as containerized soils/liquids.
- **Clean Fill Sampling:** Soil samples of the offsite fill material (common fill, select fill, and topsoil) will be obtained and analyzed for clean fill parameters prior to delivery to the site.

Sampling procedures will be compliant with USEPA, MDE, and applicable DoD specifications. The remainder of Section 4.0 of this work plan addresses information that is consistent for any type of field sampling. An example summary table for sampling and analysis is included as Table 4-1.

4.1 Sampling Methods and Procedures

The following sections identify the frequencies for the sampling activities and the analyses to be performed for each sample collected.

4.1.1 Waste Characterization Sampling

During the initial phase of the field work for the cap construction action, representative samples will be obtained of the waste within the hot spot, of the stream sediments, and of the soil/debris at Site 42, and from any drums that contain material at Site 17. The sample results will be used to characterize the waste and prepare the waste profiles for the disposal documentation. Initially, one discrete waste sample will be collected from each of the locations for this purpose.

Sample Location	Sample Point	Matrix	atives	Containers
Waste Disposal Sampling	Site 17 Drums	Soil	1° C	1-4oz jar
				3-8oz jar
Waste Disposal Sampling	Site 42 Hot Spot Soil/Debris	Soil	1° C	1-4oz jar
				3-8oz jar
Waste Disposal Sampling	Site 42 Stream Sediment	Soil	1° C	1-4oz jar
				3-8oz jar
Clean Fill Sample	Clean Fill Source	Soil	1° C	1-4oz jar
				3-8oz jar
Decon Water	Decon Water	Water	1 to 4° C	3-40 ml vov vials
			1° C	2-1 L Amber
			1° C	2-1 L Amber
			1° C	2-1 L Amber
			1° C	1-500 ml nalgene
			1° C	1-500 ml nalgene
			1 Zinc	1 500ml nalgene with NaOH and 1 500 ml Nalgene
			1° C	1-500 ml nalgene
			1° C	2-1 L Amber
			1 to 4° C	3-40 ml vov vials, 2-1 L Amber

Additional samples and analysis may be required for the disposal facility based on possible changes to the waste stream. The following Shaw Field Sampling Standard Operating Procedures (SOPs), provided in Appendix J, should be used when collecting the waste characterization samples:

- Sampling of In-Process Piles SOP-TFS-106, Revision Date 12/05/03
- Compositing Samples SOP-T-FS-011, Revision Date 08/14/03
- Sample Homogenization SOP T-FS-010, Revision Date 06/05/2003

The non-disposable sampling equipment will be thoroughly cleaned prior to sampling and between samples using the decontamination procedures described in Section 4.5. Field sampling personnel will wear disposable sampling gloves during sampling and will change gloves between sample locations to minimize the potential for cross-contamination. Other PPE may be required for sampling as per the SSHSP. Contact with the sample should be avoided to minimize the potential for cross-contamination.

4.1.2 Liquid Waste Sampling

During activities at the site, containerized water may be generated. This liquid waste may consist of decontamination water and water from handling pads. The liquid waste for this site will be collected, properly labeled, and contained until samples can be analyzed and disposal can be arranged. The analysis of the container(s) will be performed according to the criteria given in Table 4-1 to determine proper disposal. One sample per liquid type or drum will be collected through the bung port of the drum and placed in the appropriate sample containers for labeling, packaging, and shipment to the offsite laboratory.

4.1.3 Clean Fill Sampling

Sampling and analysis will be conducted on offsite soil used for the common fill for the geomembrane bedding layer, the select fill layer above the geomembrane, and the topsoil for the geomembrane cap and wetland mitigation. One composite soil sample will be obtained from the proposed offsite borrow source and analyzed for the corresponding parameters listed in Table 4-1. The procedures for sample acquisition are provided in Appendix J.

4.2 Sample Identification and Labeling

Any samples placed into a sample container will be identified by a sample label. The sample label will identify the following information:

- PROJECT NUMBER
- DATE (Month, day, year)
- TIME (Military time)
- SAMPLE NUMBER
- SAMPLE DESCRIPTION
- SAMPLER (Sampler's name)
- PRESERVATIVES
- ANALYSIS REQUIRED (See Table 4-1)

The samples collected on site will be given a unique sample number and will be verified to be in accordance with the sample numbering protocol for Indian Head. The number will serve to identify the site, location, and specific sample identification number. The sample number format will be as follows:

XXXXXX-ST-SM-NNN

where:

XXXXXX = Project Number

ST = Sample type (DW = disposal waste, DL = disposal liquid, DD = disposal drum, CF = clean fill source)

SM = Sample Matrix (SO=Soil, Aq=Aqueous)

NNN = Sequential number starting at 001 (Sequence number in Sample Log Book)

Sample location information will be included in the sample description area of the Chain-Of-Custody (COC). Sample sequential numbers are not to be duplicated. Duplicate samples, if required, will be sent to the offsite laboratory as a blind sample (i.e., different sample matrix and number).

4.3 Sample Containers, Preservation and Holding Times

Samples must be placed in sample containers certified by the manufacturer to be pre-cleaned to USEPA specifications. Containers provided by the fixed-base laboratory will be compatible with the matrix and intended analysis, and properly prepared and preserved to maintain sample integrity. Table 4-1 specifies the types of containers needed for each analytical method and matrix.

Physical and chemical preservation includes techniques designed to stabilize the concentrations of analytes in the sample matrix during the time from sample collection through preparation and analysis. All samples shall be preserved by cooling to $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ immediately after sample collection. Whenever possible, chemical preservatives will come prepared from the laboratory.

The final pH of the chemically-preserved samples will be checked using pH paper and the result recorded. The pH paper will not be dipped into the sample container to measure pH, but an aliquot of sample shall be removed for pH testing and then properly disposed. If the pH check indicates pH adjustment is necessary, additional preservative will be added to attain the correct sample pH.

A sample holding time establishes the recommended maximum time that a sample may be held under preservation before extraction and analysis without compromising sample integrity. Preservation techniques and holding times are standardized by the USEPA according to analytical method. Table 4-1 summarizes the latest information on preservation techniques and holding times for the requested analyses.

Chemical preservation is not usually recommended for solid matrix samples. Unpreserved samples that require preservation by the laboratory should be indicated on the sample label and should be flagged on the COC to identify these samples to the laboratory receiving personnel as requiring special handling.

4.4 Field Quality Control Samples

Field quality control samples are not required (i.e. duplicate samples or equipment blank samples) since the only field samples that are to be collected are for waste characterization disposal identification.

4.5 Decontamination

All sampling equipment (hand shovels, spoons, stainless steel/glass mixing bowls, etc.) will be decontaminated before sampling begins, between each sample location, and prior to leaving the site. The procedures for decontamination of equipment are as follows:

- Remove gross contamination by scraping or brushing.
- Clean with organic free water and phosphate free laboratory detergent (Liquinox™), using a stiff brush to remove all surface contaminants.
- Rinse thoroughly with organic free water and allow to air dry. Do not rinse with deionized/distilled water. If organic free water is not available, allow equipment to air dry.

Decontamination fluids will be collected in properly labeled 55-gallon drums, and staged in a secure area until final disposal, unless other arrangements are made.

4.6 Cross-Contamination Minimization

Cross contamination is the introduction of contaminants into the sample through the sampling and/or sample handling procedures. It can cause an otherwise representative sample to become non representative. The most important means of minimizing cross contamination are as follows:

- Sampling expendables (i.e., sample gloves, glass thieves, tongue depressors, pipettes, string, dip jars, etc.) should not be reused. Used expendables should be labeled so they are not confused with non contaminated trash.
- Minimum contact should be made between the sampler and the sample medium. For example, a sampler or sample gloves should not touch the sample while loading the sample into the container.
- Sample collection activities should proceed progressively from the least contaminated area to the most contaminated area.
- Sampling equipment should be constructed of Teflon®, stainless steel, or glass that has been properly pre-cleaned for collecting samples. Equipment constructed of plastic or PVC should not be used to collect samples for trace organic analyses.

- Any tools used in sampling must be carefully decontaminated prior to first use and after each use.
- Activities that could contaminate samples are prohibited in the sample handling and preparation area. These activities and the possible contaminants include:

<i>Activity</i>	<i>Possible Contaminants</i>
Smoking	Poly Aromatic Hydrocarbons
Spraying for insects	Pesticides, oils, solvents
Spraying for weeds	Herbicides, oils, solvents
Refueling	Benzene, toluene, ethylbenzene and xylenes (BTEX) and hydrocarbons
Painting and paint stripping	Solvents

4.7 Sample Logbook

It will be necessary for the sampling person or crew to maintain daily field notes in a dedicated bound field logbook. Items that must be included are notes relating to sampling protocol, any changes to the procedures, meetings, instructions, safety precautions, personnel protection, and activities pertaining to the samples. The person taking notes must be knowledgeable enough about these activities to know which details are important.

Repetition of information recorded in other permanent logs should be avoided, but enough information should be recorded to present a clear and accurate picture of technical activities. At a later date, should a question arise concerning a specific event or a procedure used, it will be answered from these notes. The following information should be logged into the logbooks and/or database:

- Date and time of sampling.
- Sample number, locations, type, matrices, volumes, sample ID and descriptions, type and number of sample containers, names and signatures of individuals performing sampling tasks, COC and air bill numbers, preservatives, date samples were sent, and date results were received.
- Names of laboratories and contacts to which the samples were sent, turn around time (TAT) requested, and data results, when possible.
- Unusual appearance or odor of a sample.
- Weather conditions.

- Additional samples and reasons for collecting them.
- Levels of protection used (with justification).
- Meetings and telephone conversations held with LANTDIV, NTR, regulatory agencies, Project Manager, or Site Superintendent.
- Details concerning any samples split with another agency.

These notes should be dated and signed (each page) for validity. All logbooks will be bound and pre numbered. All log book entries will be made with indelible ink and legibly written. The language will be factual and objective. No erasures will be permitted. If an incorrect entry is made, the error will be crossed out with a single strike mark, initialed, and dated.

4.8 Chain-of-Custody Procedures

Sample custody can be defined as physical possession of samples, having samples within visual range, or having samples located in a restricted access area. Sample possession during all sampling efforts must be traceable from the time of collection until the results are verified and reported. The sample custody procedures provide a mechanism for documentation of all information related to sample collection and handling. The primary piece of documentation to ensure sample custody is the Chain of Custody Form (COC). Shaw personnel are responsible for providing evidence of sample custody from the time of collection until the laboratory receives the samples. The laboratory will be able to provide documentation of sample custody from that point to sample disposal.

As part of appropriate documentation, all sample bottles will be adequately labeled. The label will present sample identification and collection information. It will be pre-printed from the sample tracking system or completed with indelible ink. At a minimum, all sample labels will include the following sample information:

- Field sample location and unique sample identifier
- Project name and number
- Analysis requested for each bottle
- Method of preservation for each bottle

- Date and time of collection
- Initials of sample technician.

A sample numbering system will be utilized in the field to uniquely identify each sample collected at Sites 42 and 17 at Indian Head, MD. The sample number will be traceable to the site, location, and depth (where applicable) as described previously in Section 4.2. The sample identification and description will be recorded by the Site Superintendent or representative in the sample collection logs.

4.8.1 Field Custody Procedures

The sampling team with the Site Superintendent will maintain overall responsibility for the care and custody of the collected samples until they are transferred or properly dispatched to the fixed-base laboratory. All shipping or sample transfer activities will be documented.

Transfer of custody and shipping procedures will include:

- The Site Superintendent instructing sampling team personnel in the proper COC procedures before sampling begins.
- A COC entry made in the field for each sample. This document will accompany the samples in shipment, and a copy will be maintained at the site for placement in the project files at the conclusion of field activities. The custody of individual sample containers will be documented by recording each sample identification and the number of bottles on the appropriate COC form.
- COC records initiated in the field will be placed in a plastic bag and taped to the underside of the top of the shipping cooler used for sample transport.
- Each time responsibility for custody of the sample changes, the new custodian will sign and date the record.
- All coolers must be secured at the site with two custody seals prior to transport. Custody seals should be signed and dated by the person relinquishing custody of the samples being shipped. They should be placed over the opening of each cooler so that the cooler cannot be opened without breaking the seal.

4.8.2 Laboratory Custody Procedures

All samples to be analyzed by the fixed-base laboratory will be shipped via overnight courier service. Upon receipt, a representative of the laboratory shall check the integrity of the custody seals, then locate, sign, and date the COC. The laboratory is responsible for verifying that the COC and containers are in agreement. The COC, a Cooler Receipt Form, and information regarding any discrepancies between the COC and bottle labels will be faxed to the Project Chemist prior to preparation for analysis. The Laboratory Information Management System will provide evidence of sample custody from receipt by the laboratory until appropriate disposal.

4.9 Packaging, Handling, and Shipment of Samples

Samples that are collected for offsite laboratory analysis that require overnight shipment will be generally prepared by:

- Sealing the container in an outer Ziploc® storage bag,
- Securely wrapping and taping each collected bottle in bubble wrap (or other similar shock-adsorbing material).

At least three sides of the container must be wrapped or surrounded with material when placing the samples into the shipping cooler. Adequate ice will be placed in doubled Ziploc® bags and added to the cooler around and over the top of the sample containers to form a cooling layer to help ensure proper preservation during shipment. In addition, most samples will have been pre-cooled to the desired temperature prior to packing for shipment. Completed and signed COCs will be placed into the cooler in a protective Ziploc® bag and taped to the underside of the cooler lid. A minimum of two custody seals will be applied across the opening of the cooler and the lid secured by wrapping the cooler with clear plastic packing tape. The cooler will then be ready for shipment according to the methods required by the overnight delivery service. At a minimum, the laboratory address, telephone number, and contact name should be included on the original air bill and, if multiple packages are sent, on each sample cooler.

At all times from the point of sample collection in the field through storage, inventory, preparation, and shipment, the samples must remain sealed, protected from sources of contamination, and adequately preserved by chilling.

As shipping regulations are subject to frequent updates without notification, the sample technician should, at least quarterly, petition a set of applicable shipping regulations from the overnight shipper to be assured of regulatory compliance.

4.10 Measurement Performance Criteria

Since the soil samples that are to be collected are for waste characterization for disposal. These results will be evaluated against the TCLP Maximum Contaminant Concentrations (40 CFR 261.6/96) as listed in Table 2 of Appendix I.

Laboratory established precision and accuracy criteria are listed in the laboratory SOPs in Table 1 (LCS and MS/MSD Control Limits) of Appendix I.

4.11 Analytical Laboratory and Laboratory Certification

Accutest Laboratories Southeast, Inc. located in Orlando, Florida has been chosen to complete the analytical requirements. Accutest Southeast has current standing with National Environmental Laboratories Accreditation Conference (NELAC), Army Corps validation, and a Navy approval letter. Accutest will provide copies to Shaw of all current certifications prior to project start up.

4.11.1 Laboratory Quality Systems Manual

Accutest has a detailed Quality Systems Manual, Volume VI, Revision II, dated March 2005 that is designed to meet the quality program requirements of NELAC and ISO Guide 25. This Quality Systems Manual is included in Appendix I.

4.11.2 Laboratory Standard Operating Procedures

The laboratory has established Standard Operating Procedures, each SOP has a specific SOP Number and when revisions are made, a new revision date is applied to the SOP. Distribution of updated SOPs is documented on an SOP cover page. Superseded copies of the SOPs are collected according to the distribution list contained within the SOP cover page. As these documents are updated as required, the staff is trained to apply the changes. The complete list of laboratory SOPs is included in Appendix I. These SOPs provide specific operational instructions on the execution of each quality element. The SOPs also assure that compliance with the requirements of the Quality Systems Manual is achieved. Analytical method SOPs are based upon USEPA approved methods or other recognized standard methods.

4.11.3 Laboratory Training Procedures

Laboratory senior management staff retains oversight responsibility for the data integrity program and retains ultimate responsibility for execution of the data integrity program elements. Senior laboratory management staff is responsible to provide the resources required to conduct SOP and ethics training and, to operate data integrity evaluation procedures.

Laboratory employees receive technical ethics training during new employee orientation. Additionally, they are required to attend annual ethics refreshment training and to sign an annual ethical conduct agreement, which verifies their understanding of the laboratory's ethics policy and the analysts' ethical responsibilities. Training about data integrity procedures and SOPs is conducted by the individual department's group leaders within the laboratory. All records of training are retained at the laboratory in the individual staff training folders maintained by the laboratory quality assurance officer. All information related to staff qualifications, experience, external training courses, and education are placed into the individual's training file. Verification documentation for laboratory orientation, health and safety, and quality assurance training is also maintained with the training file. Additional training documentation is added to the files soon after additional training occurs. This includes data for initial and continuing demonstrations of proficiency, performance evaluations, study data and notes, and attendance lists from individual and group training sessions.

4.11.4 Laboratory Corrective Action and Reporting Procedure

Routine corrective action is defined as procedures used to return out of control analytical systems back to control. This level of corrective action applies to all analytical quality control parameters or analytical system specification as defined in the laboratory SOPs. Bench analysts have full responsibility and authority for performing routine corrective action. Routine corrective actions are documented as part of the analytical record.

Defective processes, holding time violations, systematic errors, and quality defects that occur are to be reported immediately by the bench chemist to the section supervisor and a non-conformance record initiated. The section supervisor will notify the designated Shaw Laboratory Project Manager (Heather Wandrey) who will then notify the Shaw LANTDIV Project Chemist. All notifications must be made in a timely manner. The non-conformance record should become part of the analytical record.

4.11.5 Laboratory Instrument Calibration Procedures

Calibrations use a series of reference standards to establish the concentration range for performing quantitative analysis.

Method specific procedures for calibration are followed prior to any analysis and are established in the laboratory SOPs provided in Appendix I. It is the laboratory's responsibility to maintain logbooks of these calibrations.

4.11.5.1 Initial Calibrations

Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve.

Initial Calibrations are verified using a calibration standard, continuing validity of an existing calibration must be verified prior to sample analysis. The response to the standard must meet the criteria as stated in the laboratory SOPs and indicate that the initial calibration curve remains valid. If the criteria are not achieved corrective action, (re-calibration) is performed before any samples may be analyzed.

4.11.5.2 Continuing Calibration Verifications

Continuing calibration verification is used on a daily basis to verify whether instrument performance and the quantitation model are relatively unchanged from the day the initial calibration was performed. This process requires testing a known amount of target analyte(s), usually around mid-to-low point of initial calibration, and calculating its value using the quantitation model obtained during the process of initial calibration.

Continuing calibration verification is performed in the beginning of the analytical sequence, then used to verify calibration every ten (10) samples and at the end of the analytical sequence. Such frequency is necessary since the sample matrix is capable of interfering with instrument performance. With the exception of the GC/MS methods, where this is not required; instead, the analytical sequence is restricted to certain period of time.

In the event of a continuing calibration verification failure, refer to the laboratory method SOP for corrective action, which may include reanalysis of samples.

4.11.6 Laboratory Quality Control Samples

Prior to the analysis of the field sample, the laboratory analyst must determine that the method is functioning properly. Specific control parameters indicate whether critical processes meet specified requirements before continuing with the analysis. Method specific control parameters must be established before sample analysis can be conducted. Each of these parameters is related to processes that are under the control of the laboratory and can be adjusted if out of control.

4.11.6.1 Method Blanks (MB)

A method blank (MB) is analyzed during the analysis of any field sample one per analytical batch. The MB is defined as a sample. It contains the same standards (internal standard, surrogates) and reagents that are added to the field sample during analysis. If the MB contains target analytes at concentrations that exceed the method criteria as defined in the laboratory SOPs, the source of the contamination is eliminated before proceeding with analysis. Corrective action may include re-extraction of sample aliquot and or reanalysis.

4.11.6.2 Laboratory Control Samples (LCS)

Laboratory Control Samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of known spiked compounds. All LCS percent recoveries must be within the specified performance limits. These performance limits are derived from published method specifications or from statistical controls generated from the laboratory method performance data. Table 1 of Appendix I lists the performance limits for the project methodology. If the spike accuracy exceeds the performance limits, corrective action, as specified in the laboratory SOP for the method, is performed and verified before continuing with a field sample analysis.

The analysis of samples can be initiated following a successful demonstration of the method operating within established controls. Additional controls are incorporated into the analysis of each sample to determine if the method is functioning with established specifications for each individual sample. Sample QC data is evaluated and compared to established laboratory performance criteria as defined within the laboratory SOPs. If the criteria are not achieved, the method or the SOP specifies the corrective action required to continue sample analysis. The following three sections discuss sample control parameters.

4.11.6.3 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

Matrix Spike(MS)/Matrix Spike Duplicates(MSD) are analyzed once per twenty samples or once for each analytical batch. MS/MSDs are replicate sample aliquots to which the surrogate standard and spike standard are added. The MS/MSDs are then extracted and taken through all cleanup procedures along with the other samples within the analytical batch to monitor the analytical precision and accuracy for the sample and matrix. Precision and accuracy are method dependent. If precision and accuracy criteria are not achieved, corrective action is required as established in the laboratory SOPs. If the recoveries indicate that the problem is procedure-related, then re-extraction and reanalysis are required. If the recoveries indicate that the failures are sample-related, then the Shaw Chemist will be contacted and a decision will be made either to report the data as is with a notation in the analytical narrative or to re-extract and re-analyze the samples.

4.11.6.4 Surrogate Spikes (Organic Parameters)

Surrogate spikes are organic compounds that are similar in behavior to the target analytes but unlikely to be found in nature. They are added to quality control and field samples to measure the method performance for each individual sample. Surrogate accuracy limits are derived from published method specifications or by statistical evaluation of laboratory generated surrogate accuracy data. Accuracy data is compared to the applicable performance limits. If the surrogate accuracy exceeds the performance limits, corrective action, as specified in the method or laboratory SOP, is performed before sample data can be reported. These corrective actions include re-extracting and/or reanalyzing the sample.

4.11.6.5 Internal Standards (Organic Methods)

Internal standards are retention time and instrument response markers added to every sample to be used as references for quantitation. Their response is compared to reference standards and used to evaluate instrument sensitivity on a sample specific basis. Internal standard retention time is also compared to reference standards to assure that target analytes are capable of being located by their individual relative retention time. If the internal standard retention time criteria (as described in the laboratory SOP) are not met, corrective action is required. If failure is due to instrument performance issues, the problem must be identified, corrected, and the sample reanalyzed. If no instrumentation problem is found, the sample must be reanalyzed. If upon reanalysis the responses are still not within limits, the problem may be considered sample matrix interference.

4.11.6.6 Serial Dilutions (Metals Analysis)

Serial dilution of metals samples are analyzed to determine if the analytical matrix effects may have impacted the data being reported. If the value of the serially diluted samples does not agree with the undiluted value with a method specified range, the sample matrix may be causing interference, which may lead to either a high or low bias. If the serial dilution criterion is not achieved as defined with the laboratory SOP, the data should be flagged to indicate possible bias matrix effect.

4.11.7 Laboratory Turn-Around Time

All samples for waste disposal characterization and topsoil/backfill analysis as described in Table 4-1 will be analyzed by the laboratory on a seven calendar day turnaround time.

4.11.8 Laboratory Reporting Deliverables

All data produced by the laboratory will be required to undergo several levels of review, which will include two levels of management review at the laboratory. Since samples are being collected for waste characterization, the laboratory will be providing a summary report in PDF format which will include the following:

Signed cover page by Laboratory Director, Harry Behzadi

Laboratory Analytical Case Narrative

Sample Summary which will include Client Identification, Laboratory Accession Number, Sampling date and Sampling Time

Copy of the Chain-of-Custody Record

Copy of Sample Receipt Confirmation Form

Sample Result Forms I's

Method Blank Summary Forms, Laboratory Control Sample Summary Forms, Matrix Spike/Matrix Spike Duplicate Forms, and Surrogate Recovery Results will be included.

The laboratory will also submit a Microsoft Excel file containing the data in an electronic deliverable.

4.11.9 Laboratory Sample Disposal

All samples will be retained under proper storage conditions for a minimum of 60 days following completion of the analytical report. The laboratory disposes of all laboratory wastes following the requirements of the Resource Conservation and Recovery Act (RCRA). Accutest has obtained and maintains a waste generator identification number, FLR00001263309002 (FLR designates State of Florida).

Accutest's sample management includes generating a sample disposal list from their LIMS (Laboratory Information System), which lists all samples whose holding period has expired. Data from each sample is compared to the hazardous waste criteria established by the Florida Department of Environmental Protection (FDEP).

Samples containing constituents at concentrations above the criteria are labeled as hazardous, are segregated, and are scheduled for removal from the facility to be disposed as hazardous waste.

4.12 Data Verification

The Shaw LANTDIV Chemist will verify that data has been received for all samples that have been sent to the laboratory. An evaluation of this data will be performed to determine whether the laboratory met the QC requirements as stated in the analytical methods and laboratory SOPs. Analytical results will be compared to TCLP Maximum Contaminant Concentrations (40 CFR 261, 6/96). If any results exceed these limits, the Shaw Project Manager will be notified.

Data validation using USEPA Region III functional guidelines is not required since the use of the analytical data is characterizing the soil for disposal.

Figures

115273-A1	DRAWING NUMBER
OFFICE	
Shanghai RA	



APPROXIMATE SCALE



SCALE: AS SHOWN	SIZE: A
DELIVERY ORDER NO. 011	
CONSTR. CONTRACT NO. N62470-03-D-4402	
NAVFAC DRAWING NO. --	
SHEET I.D. FIGURE 1-1	



Shaw™ Shaw Environmental, Inc.

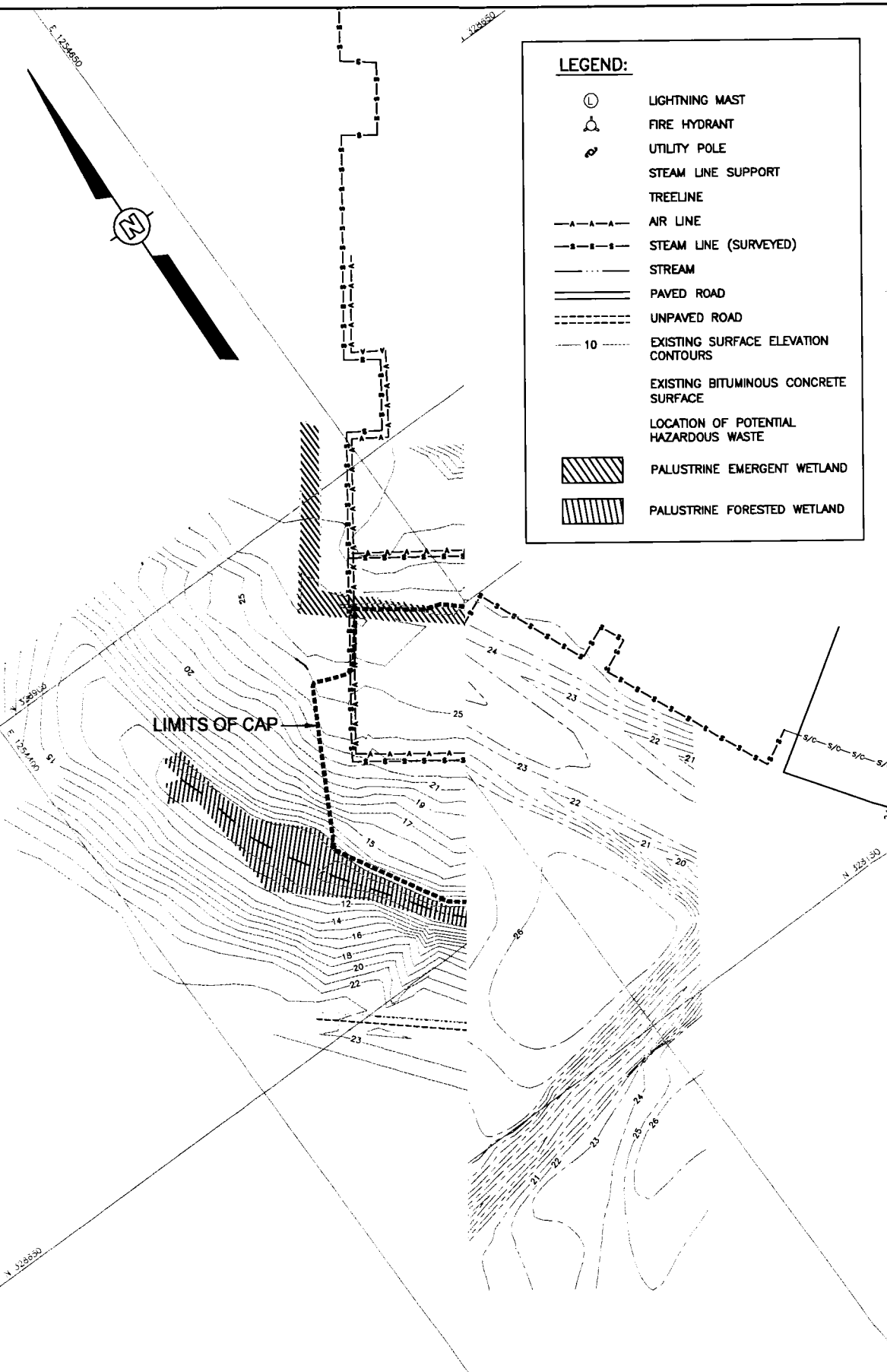
REVISIONS				DESCRIPTION/ISSUE	
DRAWN BY	CHECKED BY	REV	DATE	BY	CHK'D APPROV
B. Faison	---	---	4/21/05	P. Gamble	
			4/11/05	S. Carriere	

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 Plot Date/Time: 09/01/05 04:02pm
 Plotted by: bernadette.connor

Xref: .
 Image: NAVFAC

OFFICE
 Pittsburgh, PA

DRAWING NUMBER
 115273-D3



REFERENCE:

THIS DRAWING PREPARED FROM DRAWING SUPPLIED BY TETRA TECH NUS,
 DRAWING NO. 4020CP47, SHEET C-1 OF "FINAL SUBMISSION - SITE 42 -
 OLSEN ROAD LANDFILL, INDIAN HEAD, MARYLAND, DATED: 3/11/05 SCALE: 1"=30'



NAVAL DISTRICT WASHINGTON, INDIAN HEAD, MARYLAND
 SITE 42 AND SITE 17 - WORK PLAN

SCALE: AS SHOWN SIZE: D
 DELIVERY ORDER NO. 011
 CONSTR. CONTRACT NO. N62470-03-D-4402
 NAVFAC DRAWING NO. --

SHEET 1.D.

FIGURE 1-2



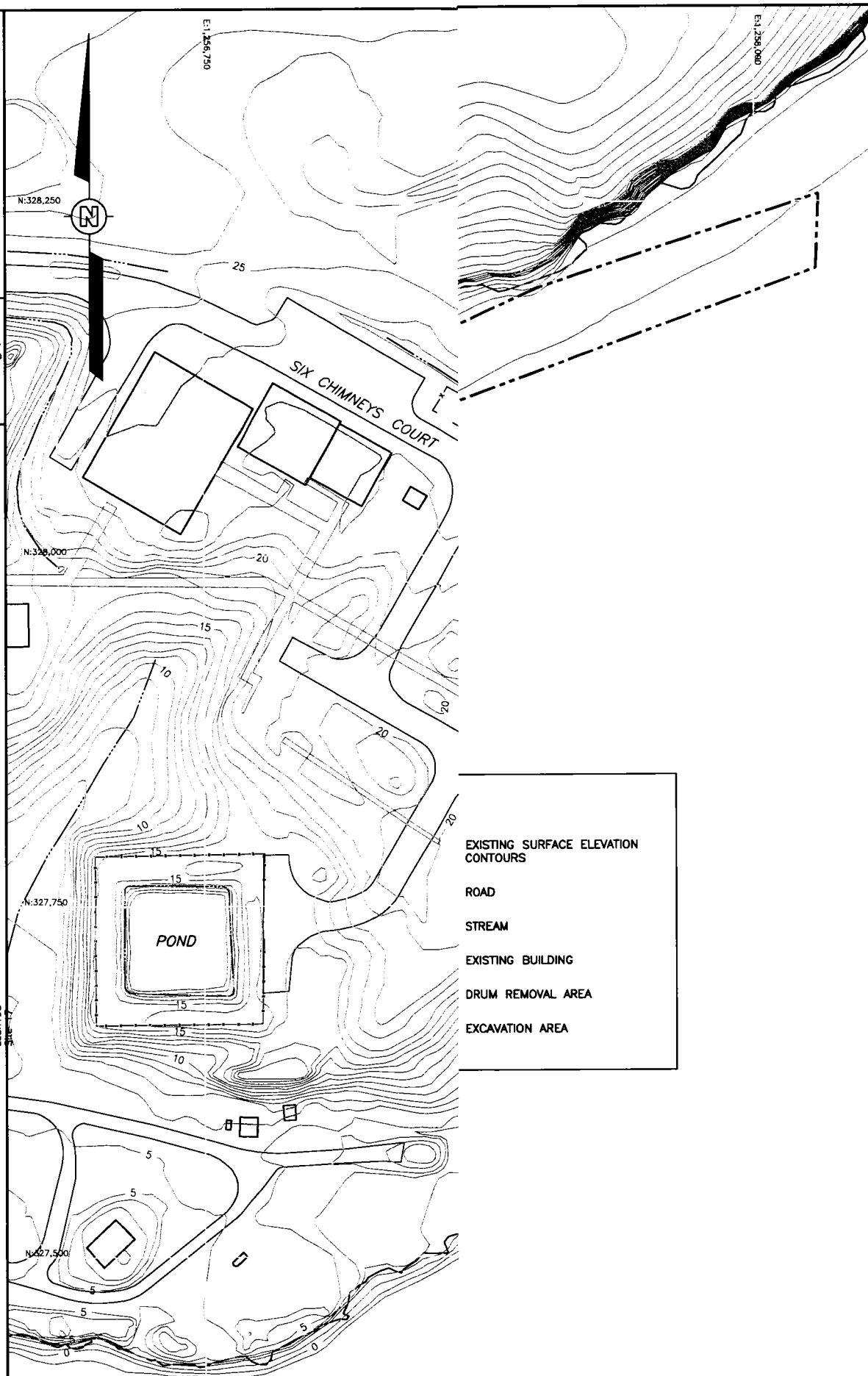
Shaw's Shaw Environmental, Inc.

DESIGNED BY	J. Folsom	CHECKED BY	P. Gamble	APPROVED BY	S. Carriere
DRAWN BY	B. Folsom	DATE	4/11/05	REV	1

REV	DATE	BY	CHK'D	APPRO'D	DESCRIPTION/ISSUE

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Plot Date/Time: 09/01/05 03:45pm
Plotted by: bernadette.oconnor

OFFICE	DRAWING NUMBER
Pittsburgh, PA	115273-D4



REFERENCE:

THIS DRAWING PREPARED FROM FIGURE 2-1 PROPOSED AREAS FOR SOIL EXCAVATION AND DRUM REMOVAL, SITE 17 EE/CA, SUPPLIED BY CH2MHILL, AUGUST 2004.

EXISTING SURFACE ELEVATION
CONTOURS

ROAD

STREAM

EXISTING BUILDING

DRUM REMOVAL AREA

EXCAVATION AREA

A horizontal scale bar with the word "SCALE" centered above it. The bar is marked with vertical lines at 0, 50, 100, and 150 feet. The segment between 0 and 50 is divided into five equal parts, each representing 10 feet. The segment between 50 and 100 is divided into two equal parts, each representing 25 feet. The segment between 100 and 150 is divided into three equal parts, each representing 16.67 feet.

SCALE: AS SHOWN	SIZE: D
DELIVERY ORDER NO. 011	
CONSTR. CONTRACT NO. N62470-03-D-4402	
NAVFAC DRAWING NO.	

SHEET I.D.

FIGURE 1-3



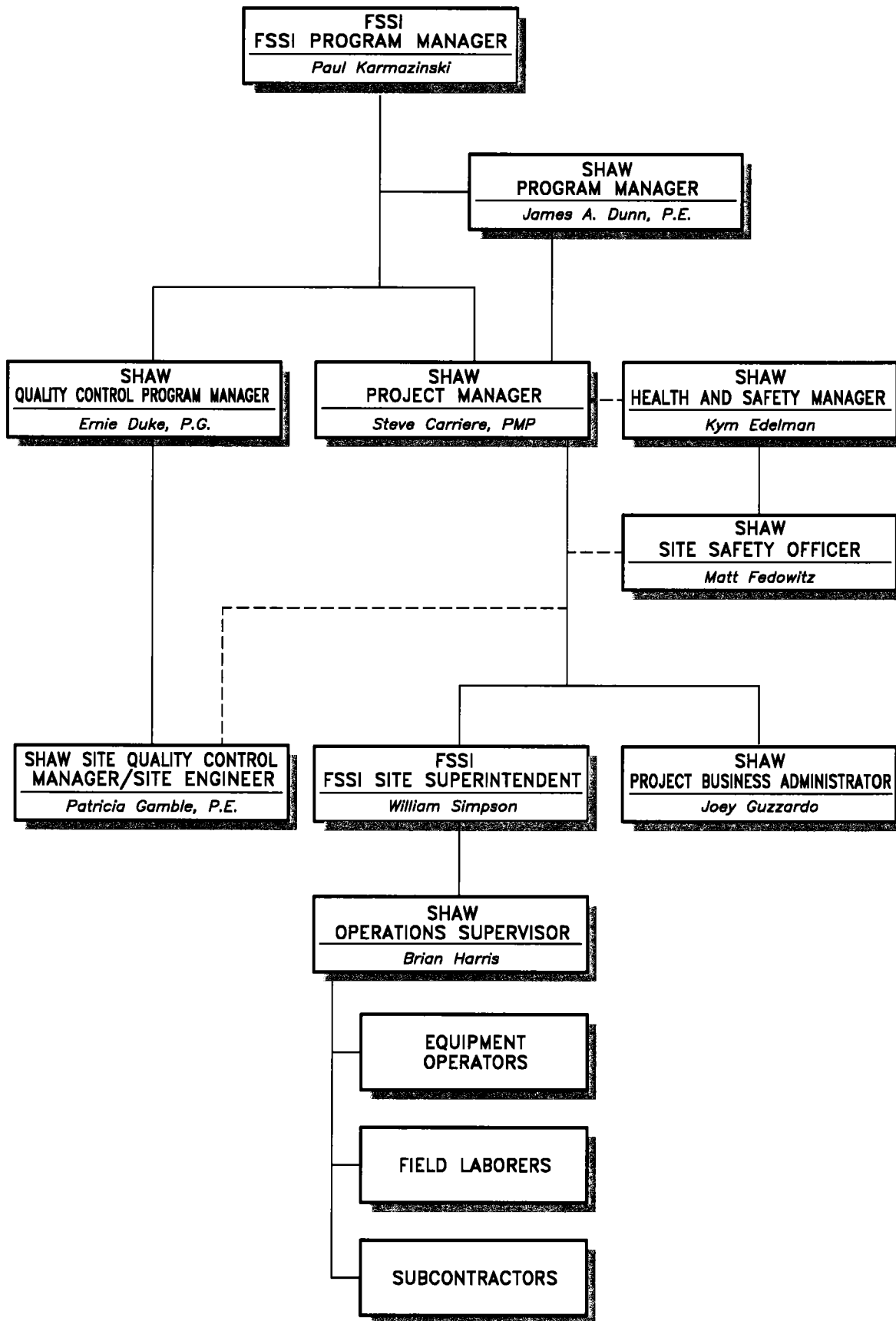
NAVFAC
Naval Facilities Engineering Command
NAVFAC WASHINGTON

NAVAL DISTRICT WASHINGTON, INDIAN HEAD	INDIAN HEAD, MARYLAND
SITE 42 AND SITE 17 - WORK PLAN	
SITE 17 - PLAN LAYOUT	

 Shaw Environmental, Inc.

DESIGNED BY	P. Gamble	4/12/05	CHECKED BY	P. Ingersoll	4/20/05
DRAWN BY	B. Falson	4/12/05	APPROVED BY	S. Carriere	8/31/05

REVISIONS



INDIAN HEAD, MARYLAND
 NAVAL DISTRICT WASHINGTON, INDIAN HEAD
 SITE 42 AND SITE 17 - WORK PLAN
 PROJECT ORGANIZATION CHART

SCALE:	AS SHOWN	SIZE:	A
DELIVERY ORDER NO.	011		
CONSTR. CONTRACT NO.	N62470-03-D-4402		
NAVFAC DRAWING NO.	--		
SHEET I.D.	FIGURE 2-1		

DESIGNED BY	CHECKED BY	APPROVED BY	DATE	REV	BY	CHK'D	APPROV'D	DESCRIPTION/ISSUE
B. Faison	P. Gamble	S. Carriere	4/11/05	8/31/05				

REVISIONS

Appendix A
Project Schedule

WBS	Activity Description	2006		
		EB	MAR	APR
		11	12	13
FSSI Olsen Road Landf				
01000010	Preconstr Kickoff Mtg - Olsen Rd & Site 1			
01001000	Mobe Personnel - Olsen Rd & Site 17			
01002050	Mobe Equipment - Site 17			
01002000	Mobe Equipment - Olsen Rd			
02000000	Olsen Road Fire Main / Utility Installation			
99004000	QC & Surveying-Olsen Rd			
01004000	Site Setup - Olsen Rd			
01004050	Site Setup - Site 17			
01005000	Materials Handling Pad Construction-Ols			
03001050	Clearing & Grubbing - Site 17			
02004000	Monitoring Well/Abandon/Install - Olsen I			
03001000	Clearing & Grubbing - Olsen Rd			
05007000	Erosion & Sediment Controls-Olsen Rd			
03005000	Drum Overpacking & Removal-Site 17			
03013000	Access Road Construction-Olsen Rd			
05007010	Erosion & Sediment Control Maint.-Olsen			
05007005	Erosion & Sediment Controls-Site 17			
08001000	Hazardous Mat. Excav. & Haul.-Olsen Rd			
05007020	Erosion & Sediment Control Maint.-Site			
08001010	Material Excavation & Hauling-Site 17			
08002000	Hazardous Mat.Screening & Loadout-Ols			
19020000	T & D -Olsen Road			
08002010	Material Screening & Loadout-Site 17			
05008000	Drainage Ditch Restoration-Olsen Rd			
19020010	T & D -Site 17			
Start Date				
Finish Date				
Data Date				
Run Date				
© Primavera Systems				

Appendix B
Project Specifications

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON
1314 HARWOOD STREET, S.E.
WASHINGTON NAVY YARD, D.C. 20374-5018

SPECIFICATION NO:
21-03-4402

CONTRACT NO:
N62470-03-D-4402

SITE 42

OLSEN ROAD LANDFILL
REMEDIAL ACTION DESIGN

at the

NAVAL DISTRICT WASHINGTON, INDIAN HEAD
INDIAN HEAD, MARYLAND

DESIGN BY:

TETRA TECH NUS, INC.
600 CLARK AVENUE, SUITE 3
KING OF PRUSSIA, PENNSYLVANIA 19406-1433

SPECIFICATION PREPARED BY:

Architectural:

N/A

Electrical:

N/A

Structural:

N/A

Submitted by:

Richard H. Smith for JT

MARCH 2005

SPECIFICATION APPROVED BY: _____

DATE: _____

PROJECT TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

01115N GENERAL PARAGRAPHS (REMEDIAL ACTION CONTRACTS)
01140N WORK RESTRICTIONS
01450N QUALITY CONTROL
01525 SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS
01575N TEMPORARY ENVIRONMENTAL CONTROLS

DIVISION 02 - SITE CONSTRUCTION

02223 TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL
02224 GEOGRAPHIC INFORMATION SYSTEM (GIS) GRADE-B POST-CONSTRUCTION
LOCATION
02315N EXCAVATION AND FILL
02372a WASTE CONTAINMENT GEOMEMBRANE
02373 GEOTEXTILE
02374a GEOSYNTHETIC DRAINAGE LAYER
02510N WATER DISTRIBUTION
02525N MONITORING WELLS
02620A SUBDRAINAGE SYSTEM
02742N PAVEMENT WITH A BITUMINOUS CONCRETE SURFACE
02953 TREES, SHRUBS, PLANTS, AND GRASS

DIVISION 10 - SPECIALTIES

10401 SIGNAGE

DIVISION 16 - ELECTRICAL

16050N BASIC ELECTRICAL MATERIALS AND METHODS
16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION
16402 INTERIOR DISTRIBUTION SYSTEM

-- End of Project Table of Contents --

SECTION 01115N

GENERAL PARAGRAPHS (REMEDIAL ACTION CONTRACTS)
09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

- | | |
|-----------------------|--|
| 29 CFR 1910 | Occupational Safety and Health Standards |
| 29 CFR 1926 | Safety and Health Regulations for Construction |
| 29 CFR 1926-SUBPART V | Power Transmission and Distribution |

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)

- | | |
|-------------|---|
| COMAR 26.17 | Department of the Environment, Waste Management |
|-------------|---|

U.S. ARMY CORPS OF ENGINEERS (USACE)

- | | |
|-----------------|---|
| COE EP 1110-1-8 | (2001) Construction Equipment Ownership and Operating Expense Schedule, Region II |
| COE EM 385-1-1 | (1996) Safety and Health Requirements Manual |

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

- | | |
|------------------|--|
| EPA 833/R-92-001 | (1992) Storm Water Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practices, Summary Guidance |
|------------------|--|

FEDERAL STANDARDS (FED-STD)

- | | |
|-------------|--|
| FED-STD-595 | (Rev. B) Colors Used in Government Procurement |
|-------------|--|

MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE)

- | | |
|----------|---|
| MDE SESC | (1994) Standards and Specifications for Soil Erosion and Sediment Control |
|----------|---|

U.S. DEPARTMENT OF DEFENSE (DOD)

- | | |
|-------------|---|
| MIL-STD-461 | (Rev. D) Control of Electromagnetic Interference Emissions and Susceptibility |
| MIL-STD-462 | (Rev. D) Measurement of Electromagnetic |

Interference Characteristics

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241

(2000) Safeguarding Construction,
Alteration, and Demolition Operations

1.2 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0, of the basic contract.

SD-01 Preconstruction Submittals

Work Plan

Explosives Safety

SD-11 Closeout Submittals

As-Built records

Environmental Conditions Report

Status reports

QC meeting minutes

Test Results Summary Report

Contractor Production Report

QC Report

Rework Items List

Permits

Stormwater Pollution Prevention Plan

Contractor's Closeout Report

1.3 WORK PLAN

Submit a Work Plan consisting of the following elements:

- a. Narrative: Provide a description of the project objectives, scheduling, sampling and analysis requirements, decontamination procedures; utility services plan including fire alarm, communication, and river water service for Building 1866; well abandonment; ordnance and explosives (OE) screening, removal, excavation, regrading, and cleaning procedures; compaction procedures; well installation procedures; wastewater treatment plan (water resulting from decontamination, excavation dewatering, excavated landfill material dewatering); storage, transportation, and treatment requirements for material disposal; and a detailed sequence of events for the construction.
- b. Technical Specifications: Provide, in an amendment format, any

additional specifications and any modifications to the contract specifications required to accurately describe the materials and work procedures envisioned to satisfy the requirements of the delivery order. Contact Design Navy Technical Representative (NTR), for availability of guide specification sections for those sections required, but not included in the contract documents.

- c. Shop drawings: Shop drawings shall detail and describe components of the project not currently indicated on the contract drawings such that the shop drawings and the contract drawings, when taken together, provide a complete representation of the project requirements. Shop drawings shall be prepared and sealed by a registered professional engineer. Shop drawings shall include:

(1) River Water Distribution System. Determine plan location, depth, and details for all existing piping, valves, and hydrants comprising the Building 1866 River Water Distribution System. Details include, but are not limited to, type, class, grade, and size of materials, joint type, and maximum working pressure of the system. Provide continuous fire protection service unless otherwise approved by the Building 1866 operator, Fire Department, and Contracting Officer.

- d. Environmental Protection Plan: At the preconstruction conference, meet with the Contracting Officer to discuss environmental protection requirements for the project. Prepare and submit an Environmental Protection Plan in accordance with Section C, Part 4.0, of the basic contract, and as specified herein.

(1) Hazardous materials (HM) to be brought onto the station: Any hazardous materials planned for use on the station shall be included in the station Hazardous Material Tracking Program maintained by the safety department. To assist in this effort, the Contractor shall submit a list (including quantities) of HM to be brought to the station and copies of the corresponding material safety data sheets (MSDS). This list shall be submitted to the Contracting Officer. At project completion, any hazardous material brought onto the station shall be removed from the site by the Contractor. The Contractor shall account for the quantity of HM brought to the station, the quantity used or expended during the job, and the leftover quantity which (1) may have additional useful life as a HM and shall be removed by the Contractor, or (2) may be a hazardous waste, which shall then be removed as specified herein.

(2) Hazardous waste (HW) generated: The Environmental Protection Plan shall list and quantify any HW to be generated during the project.

(3) Storage of hazardous waste: In accordance with station regulations, HW shall be stored near the point of generation up to a total quantity of one quart of acutely HW or 55 gallons of HW. Any volume exceeding these quantities shall be moved to an HW permitted area within 1 day. Prior to generation of HW, contact the Contracting Officer and NDW-IH Environmental Office for HW management requirements.

(4) Minimization of hazardous waste: In accordance with station regulations, the Contractor should substitute materials as

necessary to reduce the generation of HW and include a statement to that effect in the Environmental Protection Plan.

(5) Environmental conditions likely to be encountered during this project: Contact the Contracting Officer for conditions in the area of the project which may be subject to special environmental procedures. Include this information in the Preconstruction Survey. Describe in the Environmental Protection Plan any permits required prior to working the area, and contingency plans in case an unexpected environmental condition is discovered.

(6) Permitting plans for any transportation and disposal, excavation, or construction of hazardous waste that will require an environmental permit from an issuing agency: The Contractor is responsible for generating the permits and delivering the completed documents to the Contracting Officer. The Contracting Officer will review the permits and the Contractor shall file the documents with the appropriate agency and complete disposal with the approval of the Contracting Officer. Correspondence with the State concerning the environmental permits and completed permits shall be delivered to the Contracting Officer.

(7) Environmental Protection Plan format

ENVIRONMENTAL PROTECTION PLAN

Contracting Organization Address and Telephone Numbers

1. Hazardous materials to be brought onto the station
2. MSDS package
3. Employee training documentation
4. HW storage plan
5. HW to be generated
6. Preconstruction Survey results
7. Permitting requirements identified

e. Health and Safety Plan: Provide a site specific Health and Safety Plan (HASP) in accordance with Section C, Part 3.0, of the basic contract. The HASP shall include, but is not limited to, the following:

- (1) Section 01525, "Safety Requirements."
- (2) Names of the health and safety officer and names of alternates responsible for health and safety.
- (3) 29 CFR 1910.
- (4) 29 CFR 1926.
- (5) 29 CFR 1926-SUBPART V, tagout and lockout procedures.
- (6) Contract Clause "FAR 52.236-13, Accident Prevention."
- (7) Contract Clause "FAR 52.223-3, Hazardous Material Identification and Material Safety Data."
- (8) NFPA 241.

- f. QC Plan: Provide a QC Plan in accordance with Section C, Part 6.0, of the basic contract, and as specified herein.

(1) Table of Contents

- I. QC ORGANIZATION
- II. NAMES AND QUALIFICATIONS
- III. DUTIES, RESPONSIBILITY, AND AUTHORITY OF QC PERSONNEL
- IV. OUTSIDE ORGANIZATIONS
- V. APPOINTMENT LETTERS
- VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER
- VII. TESTING LABORATORY INFORMATION
- VIII. TESTING PLAN AND LOG
- IX. PROCEDURES TO COMPLETE REWORK ITEMS
- X. DOCUMENTATION PROCEDURES
- XI. LIST OF DEFINABLE FEATURES
- XII. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL
- XIII. PERSONNEL MATRIX
- XIV. PROCEDURES FOR COMPLETION INSPECTION

(2) Submittal Register: As part of the QC Plan, submit a completed Submittal Register to document quality control for materials, inspection, and testing in accordance with Section C, Part 7.0 of the basic contract. A copy of the Submittal Register is provided at the end of this section.

(3) Testing laboratory qualifications: As part of the QC Plan, submit qualifications for each laboratory which shall be used in accordance with Section C, Part 6.0, of the basic contract. Laboratories engaged in hazardous materials testing shall meet the requirements of Section C, Part 6.0 of the basic contract.

1.3.1 Forwarding Preconstruction Submittals

Within 30 calendar days of issuance of the delivery order, and before procurement, fabrication, or mobilization, submit to the Contracting Officer, and to distribution as directed by the Contracting Officer, the Work Plan, complete as specified. The Architect-Engineer shall review the Work Plan for the Contracting Officer to determine compliance of the Contractor's Work Plan with the requirements of the contract documents for this delivery order.

1.3.2 Review Comments

The Contractor's Work Plan shall be reviewed. The Contracting Officer shall compile and coordinate Government review comments, and forward consolidated review comments to the Contractor. Review comments on the Work Plan shall be resolved, and Work Plan modified as required. After the correction of the Work Plan, submit one corrected final copy to the Contracting Officer for final review. The Work Plan shall be approved prior to commencement of any other work associated with this delivery order.

1.4 EXPLOSIVES SAFETY SUBMITTAL

Submit site-specific Explosives Safety Submittal to the Department of Defense Explosives Safety Board (DDESB) for review and approval as required by Department of Defense Directive (DoDD) 6055.9 of 29 July 1996 and DoD 6055.9-STD of July 1999. Prepare Explosives Safety Submittal in accordance

with OPNAVINST 8020.15/MCO 8020.13, Section C of the basic contract, and guidelines provided in DDESB memo DDESB-KO of 27 February 1998 (NOTAL). Site work shall not commence until the Explosives Safety Submittal is approved.

1.5 RECORDS

1.5.1 As-Built Records

Maintain two sets of full size contract drawings and two sets of full size approved shop drawings marked to show any deviations which have occurred, including buried or concealed construction and utility features revealed during the course of construction. Record horizontal and vertical locations of buried utilities that differ from the contract drawings. These drawings shall be available for review by the Contracting Officer at any time. At the completion of the work, deliver marked sets of the contract drawings to the Contracting Officer. As-built conditions shall be incorporated onto the drawings electronically. Provide a post-construction survey for final topography, structures, and utilities, and other requirements of Section 02224, "Geographic Information System (GIS) Grade-B Post-Construction Location." The A/E will supply the CADD files to be used.

1.5.2 Environmental Conditions Report

Prior to starting work, perform a preconstruction survey with the Contracting Officer. Take photographs showing existing environmental conditions on and adjacent to the site. Prior to starting work, submit the results of the survey in an Environmental Conditions Report to the Contracting Officer.

1.5.3 Contract Management System (CMS)

The CMS shall be a system able to provide, as a minimum, the activities in sorts or groups as specified in the basic contract and any subsequent delivery orders.

- a. Status reports: Status reports shall comply with the basic contract and any subsequent delivery orders. Submit a Technical Progress Report, Cost Performance Report, modification log, time-scaled logic diagram, and Waste Materials Report. Submit the first delivery order status report approximately 15 days after the end of the month in which the Contractor's Work Plan was approved. Thereafter, submit status reports every 30 days. Status report periods shall be consistent with the invoice reporting periods.

1.5.4 QC Meeting Minutes

The QC representative shall document QC meetings by delivering copies of the minutes to the Contracting Officer within 3 calendar days after each QC meeting. The submittals shall comply with Section C, Part 6.0 of the basic contract.

1.5.5 Test Results Summary Report

A summary report of field tests, geotechnical laboratory, geosynthetic materials laboratory, and laboratory analytical results shall be submitted to the Contracting Officer within 30 days after laboratory receipt of samples and in accordance with Section C, Part 6.0 of the basic contract. A separate report shall be required for each set of analytical data.

1.5.6 Contractor Production Report (CPR)

The CPR shall be prepared and submitted daily to the Contracting Officer in accordance with Section C, Part 6.0, of the basic contract.

1.5.7 QC Report

The QC Report shall be submitted by the QC representative to the Contracting Officer every day work is performed, material is delivered, direction is pending, or a labor force is present in accordance with Section C, Part 6.0, of the basic contract.

1.5.8 Rework Items List

The QC representative shall deliver a copy of the Rework Items List to the Contracting Officer on a monthly basis in accordance with Section C, Part 6.0, of the basic contract.

1.5.9 Permits

Fifteen days prior to beginning of site work, submit draft copies of the following permits required for on site activities:

- a. Hot Works Permit; from the Public Works Officer, Utilities Division.
- b. Dig Permit; from the Public Works Officer, Utilities Division.
- c. Outage Permit; from the Public Works Officer, Utilities Division.

1.5.10 Contractor's Closeout Report

Submit upon completion of the project. This report shall include: introduction, summary of action, final Health and Safety Report, summary of record documents, field changes and contract modifications, final documents, complete set of geotechnical laboratory results, complete set of geosynthetic material laboratory results, complete set of field test and laboratory analytical results, documentation of off-site transportation, treatment, and disposal of materials, QC Summary Report, surveyed as-builts, color photographs documenting each major task of the project, and final cost data. Report shall also include an evaluation of the temporary on-site treatment and off-site treatment systems, including quantities of contaminated soil and wastewater treated, contaminants removed, quality of effluent, problems encountered, and solutions implemented.

1.6 FORWARDING SUBMITTALS

After approval of the work plan, and before procurement or fabrication, submit, except as specified otherwise, to the Contracting Officer, the shop drawings and technical data required in the technical sections of this specification. As requested by the Contracting Officer, the Architect-Engineer for this project may review and provide surveillance for the Contracting Officer to determine if Contractor-approved submittals comply with the contract requirements, and shall review and approve for the Contracting Officer those submittals not permitted to be Contractor approved to determine if submittals comply with the contract requirements. At each "Submittal" paragraph in the individual specification sections, a notation "G," following a submittal item, indicates the Architect-Engineer, acting as the agent for the Contracting Officer, is the approving authority

for that submittal item. One copy of the transmittal form for submittals shall be forwarded to the Contracting Officer.

1.7 PROJECT DESCRIPTION

This work includes the preparation of a work plan as previously described, and the provision of earthworks, site restoration, and other related work.

The remedial action consists of general site preparation work, utility relocation (i.e. fire alarm, communication, and river water), groundwater monitoring well abandonment, regrading of landfill material, excavation and off-site disposal of surplus waste and fill material, groundwater monitoring well installation, engineered cap construction, wetland restoration, and construction of erosion and sediment control features in order to protect potential human and ecological receptors.

1.8 LOCATION

The work shall be located at the Naval District Washington, Indian Head, Indian Head, Maryland, Site 42.

1.9 DESCRIPTION OF CONTAMINANTS PRESENT

Site 42 - Olsen Road Landfill is one of several Installation Restoration (IR) sites located at the NDW-IH facility. Between 1982 and 1987 and prior to construction of Building 1866 in 1992, the 2-acre area was used as an unauthorized disposal site for solid wastes. A supplemental preliminary assessment (PA) completed by NEESA (NEESA, 1992) concluded that unauthorized disposal occurred at the site over a 5-year period ending in 1987. It has been estimated that Site 42 contains approximately 13,000 cubic yards (cy) of landfilled material within an area of 1.43 acres (TtNUS, 2003).

1.9.1 Previous Investigations

The NEESA conducted an initial assessment study (IAS) to evaluate various sites at NDW-IH including Site 42 to determine if a potential threat to human health or the environment existed. The report identified five sites that exhibited a potential threat (Hart, 1983).

A supplemental PA report (NEESA, 1992) was prepared to evaluate additional sites, including Site 42. The PA recommended that further investigation be conducted at Site 42. Site 42 was further investigated as a follow-up to the supplemental PA during a Phase I SI. Site 42 was recommended for further study based on the results of the SI.

Removal actions to mitigate silver contamination were performed in 1992, 1993, and 1994 on two swales that drain from Site 5 - Grain Manufacture and X-Ray Building into the swales located west of Site 42. Soils and sediments were excavated and removed to below silver action levels of 10 milligrams per kilogram (mg/kg). An area adjacent to the northwestern part of Site 42 and a portion of the western swale of Site 42 were included in the removal actions for Site 5 swales (TtNUS, 2003).

In 1997, a RI was performed at Site 42 (TtNUS, 1999).

In August and September 1999, a pre-FS field investigation was performed at Site 42. The pre-FS field investigation objective was to assemble sufficient data regarding the horizontal extent of the areas requiring

remediation to support the development of the FS.

In October 2000, Science Applications International Corporation (SAIC) performed a toxicity identification evaluation (TIE) study (SAIC, 2001). The sampling and TIE study at Site 42 focused on silver as the potential source of ecological toxicity.

In January 2002 TtNUS performed a field investigation to evaluate the extent of the landfill material on the eastern portion of the site and to provide additional groundwater data.

In February 2003 TtNUS conducted a field investigation to further delineate the depth of waste within the limits of the landfill, to refine the horizontal limits of the landfill, and to provide subsurface soil analytical data to aid in estimating the amount of hazardous and non-hazardous wastes within the limits of the landfill.

1.9.2 Description of Contaminants Present

A summary of the nature and extent of contamination from the Remedial Investigation Report (TtNUS, 1999) is provided below.

Localized areas of contamination or "hot spots" appear to be present in soils and groundwater. The presence of these hot spots is consistent with the use of Site 42 as a landfill since materials placed in the landfill may serve as sources of contamination in the limited area surrounding the placement of the material.

Toluene was detected in two surface soil samples collected on the southeastern side of Building 1866. 1,4-dichlorobenzene and 4-methylphenol were detected in a surface soil sample collected on the southeastern side of Building 1866. Polynuclear aromatic hydrocarbons (PAHs) were detected at relatively low concentrations in the surface soil samples collected from the three sampling points located near the southeastern portion of Site 42.

In addition, 4,4'-DDT was detected in the five surface soil samples collected within or adjacent to Building 1866. No other semivolatile organic compounds (SVOCs), pesticides, or polychlorinated biphenyls (PCBs) were detected in surface soil samples. Analyses for metals were not performed for surface soil samples.

Bis(2-ethylhexyl) phthalate was detected in Site 42 surface, subsurface, and sediment samples at concentrations ranging from 1,700 µg/kg to 28,000 µg/kg. Although phthalates are common field and laboratory contaminants, concentrations consistently reported at these levels suggest that significant concentrations (i.e., concentrations exceeding background) of bis(2-ethylhexyl) phthalate may be present in the soils and sediment at Site 42. Several SVOCs, primarily PAHs, were infrequently detected in Site 42 subsurface soil samples. These SVOCs were detected in only four of the 77 subsurface soil samples collected, and these samples were all collected southwest of Building 1866 within or near the area of debris.

Several pesticides were detected in subsurface soil samples. Endosulfan sulfate and 4,4'-DDT were detected in 22 and 14 of 77 samples, respectively. The remaining pesticides were each detected in from one to five samples. Pesticides were detected at various depth intervals in the subsurface soils throughout Site 42. However, in general, the greatest total number and the maximum concentrations of pesticides were associated with subsurface soil samples collected from the area of debris in the undeveloped portion of the site.

The maximum concentrations of several metals detected in subsurface soil samples exceeded stationwide background concentrations. However, with the exceptions of lead, nickel, and zinc, all reported concentrations were within the available concentration ranges reported in the literature for soils of the eastern United States and/or the state of Maryland.

As previously noted, concentrations of TCE and some of its degradation products in the groundwater collected from monitoring well S42MW04 suggest the presence of a hot spot of TCE. With this exception, volatile organic compounds (VOCs) and SVOCs were infrequently detected at low concentrations in groundwater samples. Several metals were detected in the unfiltered and filtered groundwater samples collected from monitoring well S42MW07, located upgradient of the other Site 42 monitoring wells and crossgradient with Building 1866, at concentrations from two to 60 times greater than stationwide background levels. Few reported results for metals in other Site 42 groundwater samples exceeded background levels. This suggests that the source of metals contamination in the groundwater collected from monitoring well S42MW07 may be upgradient of Site 42. The maximum concentrations of a majority of the metals detected in surface water samples were detected in a surface water sample collected southwest of monitoring well S42MW07, also suggesting the possibility of an off-site upstream source of metals contamination.

Few VOCs or SVOCs were detected in sediment samples. Acetone, 2-butanone, di-n-butyl phthalate, and bis(2-ethylhexyl) phthalate were detected in sediment samples. Seven pesticides were sporadically detected in sediment samples. However, no particular pattern of pesticide concentrations was apparent from upstream to downstream sediment sampling locations.

Silver was detected in all sediment samples at concentrations ranging from 1 mg/kg to 99 mg/kg. Concentrations of cadmium and sodium in sediment samples also exceeded stationwide background levels.

1.10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK

The Contractor shall be required to (a) commence work on the Work Plan within 5 calendar days after receiving the notice to proceed, (b) prosecute the work diligently, after receiving the notice to proceed.

1.11 PROJECT INFORMATION

1.11.1 Contract Drawings

Contract drawings are as follows:

<u>DWG No.</u>	<u>NAVFAC DWG No.</u>	<u>Title</u>
T-1	3459811	Title Sheet
T-2	3459812	General Notes and Legend
C-1	3459813	Existing Conditions Plan
C-2	3459814	Erosion and Sediment Control Plan
C-3	3459815	Erosion and Sediment Control Notes
C-4	3459816	Revegetation Notes
C-5	3459817	Erosion and Sediment Control Details
C-6	3459818	Interim Grading Plan
C-7	3459819	Final Grading Plan
C-8	3459820	Cross Sections
C-9	3459821	Miscellaneous Details (Sheet 1 of 3)

<u>DWG No.</u>	<u>NAVFAC DWG No.</u>	<u>Title</u>
C-10	3459822	Miscellaneous Details (Sheet 2 of 3)
C-11	3459823	Miscellaneous Details (Sheet 3 of 3)
C-12	3459824	Site Restoration Plan
C-13	3459824A	Utility Plan
C-14	3459824B	Utility Details

1.11.2 Reference Reports

The following reference reports are available for examination in the office of the Contracting Officer and are intended only to show the existing conditions. The reports and drawings are the property of the Government and shall not be used for any purpose other than that intended by the specification.

Reports

- a. Initial Assessment Study of Naval Ordnance Station, Indian Head, Maryland, (13-021), prepared for Naval Energy and Environmental Support Activity, prepared by Fred C. Hart Associates, Inc., May 1983.
- b. Naval Assessment and Control of Installation Pollutants (NACIP) Confirmation Study Naval Ordnance Station, Indian Head, Maryland, prepared by CH2M Hill, 1985.
- c. Supplemental Preliminary Assessment Report, Naval Ordnance Station, Indian Head, Maryland (13-021A), Naval Energy and Environmental Support Activity, 1992.
- d. Final Report Site Inspection: Phase I Olson Road Landfill, prepared by ENSAFE/Allen & Hoshall, July 1992.
- e. Final Site Inspection Report, Phase II Indian Head Division, Naval Surface Warfare Center, prepared by ENSAFE/Allen & Hoshall, March 4, 1994.
- f. Background Investigation Report, Indian Head and Stump Neck Annex, Naval Surface Warfare Center, Indian Head, Maryland, prepared by Tetra Tech NUS, Inc., King of Prussia, Pennsylvania, December 1997.
- g. Remedial Investigation (RI) Report, Site 12 - Town Gut Landfill, Site 39/41 - Organics Plant/Scrap Yard, Site 42 - Olsen Road Landfill, Site 44 - Soak Out Area, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, prepared by Tetra Tech NUS, Inc., King of Prussia, Pennsylvania, July 1999.
- h. Final Feasibility Study Report for Site 42 - Olsen Road Landfill, Revision 3, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, prepared by Tetra Tech NUS, Inc., King of Prussia, Pennsylvania, December 2003.

1.12 SCHEDULING

The NDW-IH will remain in operation during the entire construction period. The Contractor shall schedule the work as to cause the least amount of interference with station operations. Work schedules shall be subject to the approval of the Contracting Officer. Permission to interrupt station

roads, railroads, or utility services shall be requested in writing a minimum of 15 calendar days prior to the desired date of interruption. Notify the Contracting Officer 48 hours prior to starting excavation.

1.12.1 Regular Work Hours

Regular working hours shall consist of an 8 1/2 hour daily period established by the Contracting Officer, Monday through Friday, excluding Government holidays.

Working hours are subject to obtaining Department of Defense Explosive Safety Board (DDESB) approval prior to commencing work due to an active explosives operating building and magazine located near the site. Working hours are subject to restrictions due to proximity to Building 1866 and other nearby buildings.

1.12.2 Work Outside Regular Hours

Work outside regular hours requires Contracting Officer approval. Contractor shall submit an application to the Contracting Officer, two regular working days prior to the scheduled working date, to allow ample time to enable satisfactory arrangements to be made by the Government for inspecting the work in progress. At night, the Contractor shall light the different parts of the work in an approved manner.

1.13 SECURITY REQUIREMENTS

The Contractor shall comply with the general security requirements as stipulated in Section C, Part 2.0, of the basic contract.

1.14 STORAGE AND TEMPORARY BUILDINGS

1.14.1 Storage in Existing Buildings

Storage in existing buildings shall not be allowed.

1.14.2 Open Site Storage Size and Location

The open site available for storage, laydown, materials handling, and decontamination shall be confined to the areas indicated by the Contracting Officer.

1.14.3 Trailers, Storage, and Temporary Buildings

Locate trailers, storage, and temporary buildings where directed and within the indicated operations area. Trailers or storage buildings shall be permitted where space is available subject to the approval of the Contracting Officer. The trailers or storage buildings shall be suitably painted and kept in a good state of repair. Failure of the Contractor to maintain the trailers or storage buildings in good condition shall be considered sufficient reason to require their removal. Trailers shall be anchored to resist high winds and shall meet applicable State or local standards for anchoring mobile trailers. A sign that conforms to the following requirements and shows the company name, telephone number, and emergency telephone number, shall be mounted on the trailer or building.

Graphic panel: Aluminum, painted blue; FED-STD-595 25053

Copy: Screen painted or vinyl die-cut, white, Universe 65 u/lc typeface.

1.14.4 Contractor Quality Control Field Office

Provide a trailer of sufficient size for an office trailer work area and floor area for the exclusive use of the quality control (QC) representative. Also provide room in the same trailer for the QC records. Provide the QC representative with a 4 by 8 foot plan table, a standard size office desk and chair, and telephone service. QC records shall be filed in the office and available at all times to the Government. QC field office trailer shall comply with the requirements specified above for other Contractor trailers.

1.15 LOCATION OF UNDERGROUND UTILITIES

Contractor shall comply with the requirements specified in Section C, Part 2.0 of the basic contract, and with requirements specified herein. Obtain station digging permits prior to the start of excavation activities. Verify elevations of existing underground utilities and obstructions before installing new work closer than the nearest manhole or other structure at which an adjustment can be made.

1.16 UTILITY SERVICES

1.16.1 Temporary Utilities

Contractor shall provide his own utilities.

1.16.2 Utility Cutovers and Interruptions

Make utility cutovers and interruptions outside regular working hours. Permission to interrupt any station utility service shall be requested in writing to the Contracting Officer a minimum of 15 calendar days prior to the desired date of interruption. Conform to procedures specified herein for work outside regular working hours. Ensure that new utilities are complete, except for the connection, before interrupting the existing service.

1.17 RESTRICTIONS ON EQUIPMENT

1.17.1 Radio Transmitter Restrictions

The Contractor shall conform to the restrictions and procedures for the use of radio transmitting equipment, as directed by the Contracting Officer. Do not use transmitters (including cell phones) without prior approval.

1.17.2 Electromagnetic Interference Suppression

Electric motors shall comply with MIL-STD-461 relative to radiated and conducted electromagnetic interference. A test for electromagnetic interference will not be required for motors that are identical physically and electrically to those that have previously met the requirements of MIL-STD-461. An electromagnetic interference suppression test will not be required for electric motors without commutation or slip rings having no more than one starting contact and operated at 3600 revolutions per minute or less.

Devices other than electric motors used by the Contractor shall comply with MIL-STD-461 for devices capable of producing radiated or conducted

interference.

Conduct tests on electric motors and the Contractor's construction equipment in accordance with MIL-STD-461 and MIL-STD-462. The test location shall be reasonably free from radiated and conducted interference.

Furnish the testing equipment, instruments, and personnel for making the tests; a test location; and other necessary facilities.

1.18 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

In conjunction with the Contract Clause "DFARS 252.236-7000, Modification Proposals-Price Breakdown," and where actual ownership and operating costs of construction equipment cannot be determined from Contractor accounting records, equipment use rates shall be based upon the applicable provisions of COE EP 1110-1-8.

1.19 PUBLIC RELEASE OF INFORMATION

Contractor shall comply with requirements stated in Section C, Part 2.0, of the basic contract.

1.20 STORM PROTECTION

Contractor shall conduct storm protection measures in accordance with the requirements of Section C, Part 2.0, of the basic contract, and as specified herein.

1.20.1 Hurricane Condition of Readiness

Unless directed otherwise, comply with:

- a. Condition ONE (sustained winds of 50 knots or greater expected within 12 hours): Secure the jobsite, and leave Government premises.
- b. Condition TWO (sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear missile hazards and loose equipment from general station areas. Contact Contracting Officer for weather and condition of readiness (COR) updates and completion of required actions.
- c. Condition THREE (sustained winds of 50 knots or greater expected within 48 hours): Maintain Condition FOUR requirements and commence securing operations necessary for Condition ONE which cannot be completed within 18 hours. Cease routine activities which might interfere with securing operations. Commence securing and stow gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to Condition TWO and continue action as necessary to attain Condition THREE readiness. Contact Contracting Officer for weather and COR updates and completion of required actions.
- d. Condition FOUR (sustained winds of 50 knots or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal

at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove debris, trash, or objects that could become missile hazards. Contact Contracting Officer for COR updates and completion of required actions.

1.21 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the delivery order, environmental protection as defined in Section C, Part 4.0, of the basic contract, and as specified herein.

1.21.1 Stormwater Pollution Prevention Plan

Prepare a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the requirements of the State's general permit for storm water discharges from construction sites. The SWPPP shall be prepared in accordance with EPA 833/R-92-001. Submit SWPPP to the Contracting Officer a minimum of 14 days prior to ground-disturbing activities. No work will be allowed on site until an approved permit is received from the State. Implement and maintain the measures specified in the SWPPP and periodically review and update the SWPPP.

The Contractor shall keep a copy of the SWPPP and the approved permit on site at the Contractor's trailer at all times. The SWPPP shall be continually updated as necessary to reflect current and changing conditions on site.

1.21.2 Fire Protection

Comply with COE EM 385-1-1, NFPA 241, and activity fire regulations. Post the activity fire poster in conspicuous locations and at telephones in construction trailers.

1.21.3 Responsible Person

In accordance with COMAR 26.17.01.06, a trained and certified "responsible person" must be on site during construction. The purpose of the "responsible person" is to train field personnel on techniques and standards that assist with the field implementation of erosion and sediment controls.

1.22 PRECONSTRUCTION CONFERENCE

After approval of the Work Plan, but prior to commencement of any work at the site, Contractor shall meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the HASP, preparation and submission of submittals, scheduling, programming, and prosecution of the work. Site Safety and Health Officer (SSHO) and major subcontractors who will be engaged in the work shall also attend.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CLEANING UP

During the progress of the remediation, the work area and adjacent areas shall be kept clean and free of rubbish, surplus materials, and unneeded construction equipment. No material or debris shall be allowed to flow or wash into watercourses, ditches, gutters, drains, or pipes. Upon completion of the work, sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish, and construction facilities from the site.

3.2 EROSION AND SEDIMENT CONTROL

Implement and maintain the approved erosion and sediment control measures shown on the approved Erosion and Sediment Control Plan and in the SWPPP. For any Contractor proposed changes to the approved plan, it shall be the sole and complete responsibility of the Contractor to obtain approval of the revised plan by the appropriate reviewing authority with no delay to the Government. Any Erosion and Sediment Control Plan revisions shall be completed in accordance with MDE SESC. Erosion and sediment control measures are only to be removed when all upstream areas are stabilized as determined by the Contracting Officer and MDE unless noted otherwise.

-- End of Section --

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CONTRACTOR

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		01115N	SD-01 Preconstruction Submittals														
			Work Plan	1.3													
			Explosives Safety	1.4													
			SD-11 Closeout Submittals														
			As-Built records	1.5.1													
			Environmental Conditions Report	1.5.2													
			Status reports	1.5.3													
			QC meeting minutes	1.5.4													
			Test Results Summary Report	1.5.5													
			Contractor Production Report	1.5.6													
			QC Report	1.5.7													
			Rework Items List	1.5.8													
			Permits	1.5.9													
			Stormwater Pollution Prevention Plan	1.21.1													
			Contractor's Closeout Report	1.5.10													
		01450N	SD-01 Preconstruction Submittals														
			(QC) Plan	1.6													
		01525	SD-01 Preconstruction Submittals														
			Accident Prevention Plan (APP)	1.8													
			Activity Hazard Analysis (AHA)	1.9													
			Crane Critical Lift Plan	1.8.1													
			Health and Safety Plan	1.10													
			SD-06 Test Reports														
			Reports	1.14													
			Accident Reports	1.14.1													

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		01525	Monthly Exposure Reports	1.14.3													
			Regulatory Citations and	1.14.4													
			Violations														
			Crane Reports	1.14.5													
			Certificate of Compliance	1.14.6													
			SD-07 Certificates														
			Confined Space Entry Permit	1.11													
		01575N	SD-01 Preconstruction Submittals														
			Environmental Protection Plan	1.11													
			Sediment and Erosion Control	1.4													
			Plan														
			SD-06 Test Reports														
			Laboratory analysis	1.5													
			Laboratory analysis	1.6.2													
			SD-11 Closeout Submittals														
			Solid waste disposal permit	1.6.1													
			Waste determination	1.6.2													
			documentation														
			Waste determination	3.5.1													
			documentation														
			Disposal documentation for	1.6.3													
			hazardous and regulated waste														
			Contractor 40 CFR employee	1.6.4													
			training records														
			Regulatory notification	1.6.5													

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01575N	Erosion and sediment control inspection reports	1.6.6													
			Solid waste disposal report	1.6.7													
			Contractor Hazardous Material Inventory Log	1.12													
		02223	SD-07 Certificates														
			Treatment facility permits	1.2.1.1													
			SD-11 Closeout Submittals														
			Shipment manifests	1.2.2.1													
			Delivery certificates	1.2.2.2													
			Disposal Site Decontamination Certificates	1.2.2.3													
			Work Site Decontamination Certificates	1.2.2.4													
			Treatment and Disposal Certificates	1.2.2.5													
		02224	SD-11 Closeout Submittals														
			Buried Utility Location Plan	2.1													
			Survey Report	2.2													
			GIS CADD file(s)	2.3													
			F-Size plot	2.4													
		02315N	SD-02 Shop Drawings														
			drawings	1.7.1													
			SD-05 Design Data														
			calculations	1.7.2													
			SD-06 Test Reports														

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		02315N	Borrow Site Testing	1.6													
			Common fill and backfill	3.12.2.1													
			Select fill	3.12.2.2													
			Coarse aggregate	3.12.2.3													
			Density tests	3.12.2.5													
			SD-07 Certificates														
			Excavation and handling	1.3.1													
			Dewatering work plan	3.3.2													
		02372a	SD-02 Shop Drawings														
			Layout and Detail Drawings	3.1.1													
			As-Built Drawings	3.12													
			SD-03 Product Data														
			Mechanical Anchoring Materials	2.4													
			Tests, Inspections, and	2.3													
			Verifications														
			Field Seaming	3.4													
			Qualifications	1.3													
			SD-04 Samples														
			Samples	3.5	G												
			SD-06 Test Reports														
			Geomembrane materials	2.1													
			GCL properties	2.2													
			Surface Preparation	3.1.2													
			Non-Destructive Field Seam	3.6.1													
			Continuity Testing														
			Destructive Field Seam Testing	3.6.2													

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		02372a	Destructive Seam Test Repairs	3.7.1													
			Interface Friction Testing	2.3.1													
			Tests	3.6													
			Multi-Axial Tensile Test	2.3.2.3													
		02373	SD-03 Product Data														
			Thread	2.1.2													
			Quality Control Manual	2.2													
			SD-04 Samples														
			Quality Assurance Samples and Tests	3.1													
			SD-07 Certificates														
			Geotextile	2.1.1													
			Independent Laboratory	1.3													
			Qualifications														
		02374a	SD-03 Product Data														
			Sampling and Testing	2.3													
			Seams and Overlaps	3.1.3													
			Construction Quality Control	1.3													
			Laboratory Qualifications														
			SD-04 Samples														
			Geosynthetic Drainage Layer	2.1													
			SD-06 Test Reports														
			Sampling and Testing	2.3													
			Geosynthetic Drainage Layer	2.1													
		02510N	SD-03 Product Data														
			Piping Materials	2.1.1													

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		02510N	Water distribution main	2.1													
			Hydrants	2.1.2.2													
			Valve boxes	2.1.2.3													
			SD-07 Certificates														
			Water distribution main	2.1													
			Lining	2.1.1.1													
			hydrants	2.1.2.2													
			SD-08 Manufacturer's Instructions														
			Installation	3.1.1													
		02525N	SD-02 Shop Drawings														
			Well construction	1.6.1													
			SD-03 Product Data														
			Well riser	2.1													
			Well screen	2.2													
			Filter pack	2.3													
			Cement/bentonite grout	2.4.2													
			Bentonite pellet seal	2.4.1													
			SD-07 Certificates														
			Well Drilling/Development	1.6.2													
			Material Handling Plan														
			Field Sampling and Laboratory	1.6.4													
			Testing Plan														
			Treatment facility permit	1.6.5													
			Installation Survey Report	3.7													
			Well Development Report	1.6.6													
			Well Abandonment Report	1.6.7													

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CONTRACT NO.

TITLE AND LOCATION

SITE 42, OLSEN ROAD LANDFILL, RAD, NDW-IH, INDIAN HEAD, MD

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT OR CLASSIFICATION REVIEW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02525N	Borehole Analysis Report	3.2.2													
			SD-11 Closeout Submittals														
			Well Construction Permit	1.6.8													
		02620A	SD-04 Samples														
			Pipe for Subdrains	2.1													
			SD-07 Certificates														
			Pipe for Subdrains	2.1													
		02742N	SD-06 Test Reports														
			Subbase material density	3.2													
			Subbase Course	3.10.1													
			Bituminous Concrete Courses	3.10.2													
			Test														
			SD-07 Certificates														
			Subbase materials	2.1													
			Tack coat	2.4													
			Bituminous concrete	2.2													
		02953	SD-06 Test Reports														
			Erosion control materials	2.12													
			Topsoil	2.2													
			SD-07 Certificates														
			Wetland seed mixture	2.7.3.3													
			Nursery certifications	2.1.1													
		16302N	SD-03 Product Data														
			600 volt wires and cables	2.1.3.1													
			SD-06 Test Reports														
			Acceptance checks and tests	3.2.1	G												

[illegible]

SECTION 01140N
WORK RESTRICTIONS
09/00

PART 1 GENERAL

1.1 REFERENCES

The publication listed below forms a part of this specification to the extent referenced. The publication is referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE EM 385-1-1

(1996) Safety and Health Requirements
Manual

1.2 SPECIAL SCHEDULING REQUIREMENTS

- a. Building 1866, its parking lot, Olsen Road, and other nearby buildings will remain in operation during the entire construction period. Due to operations conducted in Building 1866, the Contractor shall not be on-site while Building 1866 is in use. The Contractor shall schedule operations with the tenants of Building 1866 and other nearby buildings, and conduct his operations so as to not cause any interference with normal operations of the activity.

1.3 CONTRACTOR ACCESS AND USE OF PREMISES

1.3.1 Station Regulations

Ensure that Contractor personnel employed on the Station become familiar with and obey Station regulations. Keep within the limits of the work and avenues of ingress and egress as directed. Do not enter any restricted areas unless required to do so and until cleared for such entry. The Contractor's equipment shall be conspicuously marked for identification.

1.3.1.1 Additional Station Regulations

Specific routes to the job sites will be designated for Contractor personnel. No Contractor's employee will be permitted to deviate from these routes, nor will Contractor's employees leave the job site to enter other areas of the Station without permission of the Commanding Officer as granted via the Contracting Officer. Contractor employees shall not bring matches and/or lighters into the restricted area of the Station. All matches and lighters shall be given to the security personnel at Building 1665 (Post No. 2) prior to entering this area. Any Contractor's employee who violates the provisions of this paragraph may, at the discretion of the Commanding Officer via the Contracting Officer, be escorted from the Station forthwith and barred from further entry.

1.3.2 Working Hours

In accordance with Section 01115N "General Paragraphs (Remedial Action Contracts)."

1.3.3 Work Outside Regular Hours

In accordance with Section 01115N "General Paragraphs (Remedial Action Contracts)."

1.3.4 Utility Cutovers and Interruptions

In accordance with Section 01115N "General Paragraphs (Remedial Action Contracts)."

1.4 SECURITY AND SAFETY REQUIREMENTS

Contract Clause "FAR 52.204-2, Security Requirements, Alternate II," "FAC 5252.236-9301, Special Working Conditions and Entry to Work Area."

1.4.1 NDW-IH Access

No employee or representative of the Contractor will be admitted to the work site unless he furnishes satisfactory proof that he is a citizen of the United States or is specifically authorized admittance by the Contracting Officer.

1.4.2 NDW-IH Access Information

The Station is a secured facility. Furnish to the Contracting Officer a list showing the names and social security numbers of all employees and representatives to be engaged at the site. Update the list with each addition or deletion to such engagement.

1.4.3 Restrictions to Ensure Safety

When the work at NDW-IH is within a restricted area the work is potentially hazardous due to danger from explosives. Pursuant to the clause of the basic contract entitled "Accident Prevention" and the paragraph entitled "Station Regulations," safety shall be given particular emphasis. Paragraph (f) of the clause of the basic contract entitled "Accident Prevention" is applicable. It is the Contractor's responsibility to comply with COE EM 385-1-1, and additional safety requirements into daily working procedures that will provide safe working conditions for contract duration. Any Contractor's employee who violates these regulations may, at the discretion of the Commanding Officer, be escorted from the Station and barred from further entry.

1.4.4 Restricted Area Safety Regulations

Extraordinary safety regulations for the restricted area include the following:

1. Prior to starting any maintenance, repair, or construction, contract job superintendent must meet with an NDW-IH Safety Department representative to become familiar with NDW-IH safety regulations.
2. Authorization (Work Permits) to commence scope of contract will be obtained from the NDW-IH Safety Department via Contracting Officer.
3. Smoking, carrying matches, lighters, or other flame or spark-producing items on person, in vehicles, or other carriers, is prohibited in the Restricted Area of NDW-IH. Smoking areas

will be designated by the NDW-IH Safety Department, upon request, via the Contracting Officer. Approval will be based on the specific operational safety concerns within the area requested.

4. The use of welding equipment, tar pots, gas burners, etc., is prohibited unless authorized by the NDW-IH Safety Department. Once approved these instruments that may be lighted by use of striker must be done so. If matches are required, they will be provided by the NDW-IH Safety Department - for use only as authorized - to the contract superintendent. Note: LPG is not allowed within the explosives areas of NDW-IH.
5. All hot (open-flame) work will be secured 30 minutes prior to leaving work area unless a watchman is on duty for at least 30 minutes after end of work period. At no time will open-flame burning for debris disposal or other purposes be authorized.
6. Prior to any maintenance or repair to explosives-contaminated equipment, such equipment must be inspected by the NDW-IH Safety Department and by NDW-IH area supervisor. All explosives-contaminated materials must be decontaminated by NDW-IH methods and supervision prior to removal from the Restricted Area.
7. All traffic rules, regulations, and control devices must be adhered to. Speed limits as posted prevail, intra-plant area roadways require 15 mph unless posted otherwise, and 10 mph must be maintained on Nobel Road. All other roads 25 mph unless otherwise posted.
8. Only necessary, approved, Contractor vehicles will be allowed in the Restricted Area. These must be equipped with adequate exhaust systems and maintained in good mechanical and physical condition at all times. Spark arrestor devices, where designated, must be provided by Contractor and subjected to inspection by the NDW-IH Safety Department prior to entering posted hazards. For all vehicles entering into the explosive areas of NDW-IH, safety inspections will be required prior to receiving a vehicle pass from the NDW-IH Safety Department.
9. Blocking of roadways with equipment will not be allowed at any time. Securing roadways with barricades will be accomplished only upon approval of the NDW-IH Safety Department and notification of NDW-IH Security and Fire Departments. Where possible, an adequate fire lane must be provided around approved obstruction(s) for emergency equipment.
10. Securing of plant utilities (air, steam, water, etc.) will be accomplished only upon approval of NDW-IH Utilities Division, only when written outage has been obtained in writing from the Contracting Officer.
11. Securing of Fire Protection devices will be accomplished only on the approval of the Fire Chief, or his designated acting Chief, through the Contracting Officer.
12. All roadways and walkways will be kept clear of debris at all times. Cleaning of same will be accomplished by the Contractor at least daily, or as frequently as conditions necessitate.

13. No power actuated tools or devices may be used.
14. Contractor employees are restricted from buildings not included in contract with exception of lunchrooms, change houses, etc., and other areas agreed to by the Division Head and Contracting Officer.
15. Fuels, oils, and lubricants
 - a. Refueling of equipment and vehicles with flammable liquids will be done in areas designated by the NDW-IH Safety Department. All equipment used in flammables handling or operations must be of an approved type, per Underwriters' Laboratory or Factory Mutual certifications. Adequate fire protection devices must be on the scene during refueling operations.
 - b. Used oil, oil filters, and empty oil cans will be removed from NDW-IH by the Contractor.
 - c. The Contractor must inform the NDW-IH Safety and Public Works Department representatives of all Contractor-owned Hazardous Material that will be used, stored, or handled at NDW-IH. If NDW-IH employees are exposed to these materials, or potential for exposure exists, NDW-IH employees shall:
 - (1) Be informed and trained as required by NDW-IH NAVSURFWARCEN 5100.22G.
 - (2) Have a Material Safety Data Sheet accessible at the workplace for each material used for their review.
 - d. The Contractor shall ensure that Contractor employees have been informed/trained about the identification and hazards of the hazardous materials used for this project at NDW-IH.
16. The NDW-IH routinely works with electro-explosive devices (EEDs) such as igniters, squibs, detonators, and blasting caps. Radio frequency transmissions can, under certain circumstances, provide enough energy to initiate or degrade performance of these devices. Inadvertent initiation of EEDs can result in injury or death of personnel and damage or destruction of property. Degradation of the EED can result in injury or death of personnel and damage or destruction of property. Degradation of the EED can result in failure of the item to function properly when needed.

BECAUSE OF THESE HAZARDS, USE OF CB RADIOS, CAR TELEPHONES, AND CELLULAR TELEPHONES ARE PROHIBITED IN THE RESTRICTED AREA (AREA BEYOND POST 2).

17. Vehicle and construction equipment inspections include the appropriate factors listed below for safe use and conditions.
 - a. Steering mechanism; must be free of defects or excessive play.
 - b. Horns and warning devices must be operative.
 - c. Windshield wipers must be provided and operative.
 - d. Windshield and other window glass must be free of defects. Windshield must be provided on standard equipped vehicle.

- e. Rearview mirrors; must be provided and free of defects.
 - f. Lights; all standard lights must be provided, operative, and free of defects - including lens coverings.
 - g. Exhaust systems must be provided, free of defects, and properly supported.
 - h. Fuel systems must not indicate evidence of defects.
 - i. Brakes; operative without drag, including serviceable emergency brakes.
 - j. Tires; must have ample tread and be free of defects.
 - k. Electrical wiring must not have exposed surfaces or be loosely supported.
 - l. Body conditions; must be well maintained, no loose or jagged edges, excessive grease or oil on engine, and all standard features provided and operable.
 - m. Where applicable, inspection will include other such items as gauges, thermometers, controls, relief valves, piping, mechanical locks, limit switches, connectors, and other safety related devices associated to vehicles and equipment admitted to the Activity.
18. Contract trailers will be equipped with plexiglass windows when spotted within the quantity distance arcs of explosive-operating areas.
19. Additional requirements may be designated on the Work Permit based upon contract scope and NDW-IH area involved.

Manager, OSH & Explosives
Safety Inspection Branch

Date

Firm Principal

Contract #

Date

1.5 RESTRICTIONS ON OPERATIONS

1.5.1 Restrictions Upon Interrupting Utility Services

The clause of the Basic Contract entitled "Schedules for Construction Contract"; the paragraph entitled "Order of Work"; and the following apply:

- a. Ensure that new utility lines are complete, except for the connections, before interrupting existing service.
- b. Interruption to Water, Fire Water, Steam/Air, Sanitary Sewer, Storm Sewer, Telephone Service, Electrical Service, Air Conditioning, Heating, Fire Alarm, and Compressed Air: These shall be considered utility cutovers pursuant to paragraph entitled "Work Outside Regular Hours." This limit includes time for deactivation and reactivation.

- c. Operation of Station Utilities: The Contractor shall not operate nor disturb the setting of control devices in the station utilities system, including electrical and river water. The Government will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer giving reasonable advance notice when such operation is required.

1.5.2 Restrictions Upon Interrupting Station Operations

Reference is made to the paragraph entitled "Order of Work." The work under this contract requires special attention to the scheduling and conduct of the work in connection with existing operating systems. Identify on the project schedule each factor which constitutes a potential interruption of operations.

Notify the Contracting Officer in writing 15 calendar days prior to a necessary shut-down or interruption.

1.5.3 Outages

Outages of utilities shall be obtained during other than normal working hours, except such outages which are more advantageous to the Government shall be obtained during normal working hours.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01450N

QUALITY CONTROL

06/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 1077	(2003a) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D 3666	(2003a) Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 3740	(2004) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2003) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD QSMEL	(2002) Quality Systems Manual for Environmental Laboratories
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1.2 SUBMITTALS

Submit the following in accordance with Section C of the basic contract.

SD-01 Preconstruction Submittals

Quality Control (QC) Plan

Submit a QC Plan within 30 calendar days prior to mobilization.

1.3 INFORMATION FOR THE CONTRACTING OFFICER

Deliver the following to the Contracting Officer during construction:

- a. Combined Contractor Production Report/Contractor Quality Control Report (CPR/CQCR) (1 sheet): Submit the report electronically by 10:00 AM the next working day after each day that work is performed. Mail or hand-carry the original (wet signatures) and 1 copy the day of the electronic submission.

- b. Monthly Summary Report of Field Tests: Submit the report as an electronic attachment to the last daily CPR/CQCR each month. Mail or hand-carry the original attached to the last daily CQCR of each month.
- c. Testing Plan and Log: Submit the report as an electronic attachment to the last daily CPR/CQCR of each month. Mail or hand-carry the original attached to the last daily CQCR of each month.
- d. Rework Items List: Submit entries to this report daily, in the same manner as the CPR/CQCR. Mail or hard-carry the original attached to the last daily CQCR of each month and 1 copy attached to each CQCR copy.
- e. QC Certifications: As required by the paragraph entitled "QC Certifications."

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. The QC program consists of a QC Manager, a QC Plan, QC meetings, three phases of control, submittal review, submittal approval except for submittals designated for Contracting Officer approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this contract. The QC program shall cover construction operations on-site and off-site and shall be keyed to the proposed construction sequence.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

Provide a QC Manager at the work site to implement and manage the QC program. The QC Manager is required to conduct the QC meetings, perform the three phases of control, perform submittal review, perform submittal approval except for submittals designated for Contracting Officer approval, ensure testing is performed and QC certifications and documentation required in this contract. In addition to managing and implementing the QC program, the QC Manager may perform the duties of project superintendent.

1.5.1.2 Qualifications

An individual with a minimum of 3 years experience in the following positions: foreman, superintendent, inspector, QC Manager, project manager or construction manager on similar size and type construction contracts which included the major trades that are part of this contract.

1.5.2 QC Specialists Duties and Qualifications

Provide a separate QC specialist at the work site for each of the areas of responsibilities, specified below, who shall assist and report to the QC Manager and who may perform production related duties but must be allowed sufficient time to perform their assigned quality control duties. QC specialists are required to attend QC meetings, and be physically present at the construction site to perform the three phases of control and prepare

documentation for each definable feature of work in their area of responsibility at the frequency specified below.

<u>Qualification/Experience in Area of Responsibility</u>	<u>Area of Responsibility</u>	<u>Frequency</u>
Mechanical Inspector (5 years minimum)	Abandonment, relocation, and testing of river water system	Full time during abandonment, installation, and testing
Registered Electrician (5 years minimum)	Relocation and testing of fire alarm and communication systems	Full time during installation, and testing

1.6 QUALITY CONTROL (QC) PLAN

1.6.1 Requirements

Provide, for approval by the Contracting Officer, a QC Plan that covers both on-site and off-site work and includes the following:

- a. A table of contents listing the major sections identified with tabs in the following order:
 - I. QC ORGANIZATION
 - II. NAMES AND QUALIFICATIONS
 - III. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL
 - IV. OUTSIDE ORGANIZATIONS
 - V. APPOINTMENT LETTERS
 - VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER
 - VII. TESTING LABORATORY INFORMATION
 - VIII. TESTING PLAN AND LOG
 - IX. PROCEDURES TO COMPLETE REWORK ITEMS
 - X. DOCUMENTATION PROCEDURES
 - XI. LIST OF DEFINABLE FEATURES
 - XII. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL
 - XIII. PERSONNEL MATRIX
 - XIV. PROCEDURES FOR COMPLETION INSPECTION
- b. A chart showing the QC organizational structure.
- c. Names and qualifications, in resume format, for each person in the QC organization.
- d. Duties, responsibilities and authorities of each person in the QC organization.
- e. A listing of outside organizations such as, testing laboratories, architectural and consulting engineering firms that will be employed by the Contractor and a description of the services these firms will provide.
- f. A letter signed by an officer of the firm appointing the QC Manager and stating that the QC Manager is responsible for implementing the QC program as described in this contract. Include in this letter the responsibility of the QC Manager to implement and manage the three phases of quality control, and the QC Manager's authority to stop work which is not in compliance

with the contract, and the authority to direct the removal and replacement of non-conforming work.

- g. Procedures for reviewing, approving and managing submittals. Provide the names of the persons authorized to review and certify submittals prior to approval. Provide the initial submittal of the Submittal Register as specified in Section C of the basic contract.
- h. Testing laboratory information required by the paragraphs entitled "Accreditation Requirements" or "Construction Materials and Environmental Testing Laboratory Requirements", as applicable.
- i. A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test.
- j. Procedures to identify, record, track and complete rework items.
- k. Documentation procedures, including proposed report formats.
- l. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and requires separate control requirements. As a minimum, if approved by the Contracting Officer, consider each division of the specifications as a definable feature of work. However, at times, there may be more than one definable feature of work in each division of the specifications.
- m. Procedures for performing the Three Phases of Control. The Preparatory and Initial Phases and meetings shall be conducted with a view towards obtaining quality construction by planning ahead and identifying potential problems for each definable feature of work.
- n. A personnel matrix showing for each section of the specification who will review and approve submittals, who will perform and document the three phases of control, and who will perform and document the testing.

1.6.2 Preliminary Work Authorized Prior to Approval

The only work that is authorized to proceed prior to the approval of the QC Plan is mobilization, utility relocation, and surveying.

1.6.3 Approval

Approval of the QC Plan is required prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary to ensure the specified quality of work. The Contracting Officer reserves the right to interview the QC Manager at any time in order to verify his/her submitted qualifications.

1.6.4 Notification of Changes

Notify the Contracting Officer, in writing, of any proposed change, a minimum of seven calendar days prior to a proposed change. Proposed changes must be approved by the Contracting Officer.

1.7 QC MEETINGS

After the start of construction, the QC Manager shall conduct QC meetings once every week at the work site with the project superintendent, QC specialists, and foreman responsible for the upcoming work. The QC Manager shall prepare the minutes of the meeting and provide a copy to the Contracting Officer within 2 working days after the meeting. The Contracting Officer may attend these meetings. The QC Manager shall notify the Contracting Officer at least 48 hours in advance of each meeting. As a minimum, the following shall be accomplished at each meeting:

- a. Review the minutes of the previous meeting;
- b. Review the schedule and the status of work:
 - (1) Work or testing accomplished since last meeting
 - (2) Rework items identified since last meeting
 - (3) Rework items completed since last meeting;
- c. Review the status of submittals:
 - (1) Submittals reviewed and approved since last meeting
 - (2) Submittals required in the near future;
- d. Review the work to be accomplished in the next 2 weeks and documentation required. Schedule the three phases of control and testing:
 - (1) Establish completion dates for rework items
 - (2) Preparatory phases required
 - (3) Initial phases required
 - (4) Follow-up phases required
 - (5) Testing required
 - (6) Status of off-site work or testing
 - (7) Documentation required
- e. Resolve QC and production problems;
- f. Address items that may require revising the QC plan:
 - (1) Changes in procedures.

1.8 THREE PHASES OF CONTROL

The QC Manager shall perform the three phases of control to ensure that work complies with Contract requirements. The three phases of control shall adequately cover both on-site and off-site work and shall include the following for each definable feature of work: A definable feature of work is a task which is separate and distinct from other tasks and requiring separate control requirements.

1.8.1 Preparatory Phase

Notify the Contracting Officer at least 2 work days in advance of each preparatory phase. Conduct the preparatory phase with the superintendent, the QC specialists, and the foreman responsible for the definable feature of work. Document the results of the preparatory phase actions in the daily CQCR. Perform the following prior to beginning work on each definable feature of work:

- a. Review each paragraph of the applicable specification sections;
- b. Review the contract drawings;
- c. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;
- d. Review the testing plan and ensure that provisions have been made to provide the required QC testing;
- e. Examine the work area to ensure that the required preliminary work has been completed;
- f. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data;
- g. Discuss construction methods;
- h. Review the Health and Safety Plan (HASP) and appropriate activity hazard analysis (AHA) to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.

1.8.2 Initial Phase

Notify the Contracting Officer at least 2 work days in advance of each initial phase. When construction crews are ready to start work on a definable feature of work, conduct the initial phase with the QC Specialists and the foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily CQCR. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each definable feature of work:

- a. Establish the quality of workmanship required;
- b. Resolve conflicts;
- c. Ensure that testing is performed; and,
- d. Review the HASP and the appropriate AHA to ensure that applicable safety requirements are met.

1.8.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as

necessary until the completion of each definable feature of work and document in the daily CQCR:

- a. Ensure the work is in compliance with Contract requirements;
- b. Maintain the quality of workmanship required;
- c. Ensure that testing is performed; and,
- d. Ensure that rework items are being corrected.

1.8.4 Notification of Three Phases of Control for Off-Site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

1.9 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review and approval of submittals are described in Section C of the basic contract.

1.10 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this Contract.

1.10.1 Accreditation Requirements

Construction materials, environmental, and geosynthetic materials testing laboratories performing work for Navy construction contracts will be required to submit the following:

- a. A copy of the Certificate of Accreditation and Scope of Accreditation by an acceptable laboratory accreditation authority.

Construction materials, environmental, and geosynthetic materials testing laboratories performing work for Navy construction contracts must be accredited by one of the laboratory accreditation authorities. The construction materials testing laboratory's scope of accreditation must include the ASTM standards listed in the paragraph titled "Construction Materials Testing Laboratory Requirements" as appropriate to the testing field. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office".

1.10.2 Construction Materials, Environmental, and Geosynthetic Materials Testing Laboratory Requirements

Provide an independent construction materials, environmental, and geosynthetic materials testing laboratory accredited by an acceptable laboratory accreditation authority to perform sampling and tests required by this Contract. Testing laboratories that have obtained accreditation by an acceptable laboratory accreditation authority listed in the paragraph entitled "Laboratory Accreditation Authorities" shall submit to the Contracting Officer, a copy of the Certificate of Accreditation and Scope of Accreditation. The scope of the laboratory's accreditation shall include the test methods required by the contract. For testing laboratories that have not yet obtained accreditation by an acceptable laboratory accreditation authority listed in the paragraph entitled "Laboratory Accreditation Authorities" submit an acknowledgment letter from

one of the laboratory accreditation authorities indicating that the application for accreditation has been received and the accreditation process has started, and submit to the Contracting Officer for approval, certified statements, signed by an official of the testing laboratory attesting that the proposed laboratory, meets or conforms to the ASTM standards listed below as appropriate to the testing field.

- a. Laboratories engaged in testing of construction materials shall meet the requirements of ASTM E 329.
- b. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077.
- c. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D 3666.
- d. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740.
- e. Laboratories engaged in environmental and Hazardous Materials Testing shall meet the requirements of OSHA and EPA.
- f. Construction materials sampling and testing shall be under the technical direction of a Registered Professional Engineer (P.E.) with at least 5 years of experience in construction materials handling.

1.10.3 Laboratory Accreditation Authorities

Construction materials laboratory accreditation authorities are the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology, the American Association of State Highway and Transportation Officials (AASHTO) program, ICBO Evaluation Service, Inc. (ICBO ES), and the American Association for Laboratory Accreditation (A2LA) program, and the Washington Area Council of Engineering Laboratories (WACEL) (approval authority by WACEL is limited to projects within the Chesapeake Division and Public Works Center Washington geographical area).

Environmental testing laboratory accreditation authorities are the Department of Defense (DOD) National Environmental Laboratory Accreditation Program (NELAP), EPA's National Environmental Laboratory Accreditation Conference (NELAC), and the State of Maryland. The environmental testing laboratory accreditation authorities are subject to the approval of the Contracting Officer. The environmental testing laboratory's quality systems program shall be prepared and implemented in accordance with DOD QSMEL.

Geosynthetic material testing laboratory accreditation authority is the Geosynthetic Accreditation Institute - Laboratory Accreditation Program. The geosynthetic material testing laboratory accreditation authority is subject to the approval of the Contracting Officer.

Furnish to the Contracting Officer, a copy of the Certificate of Accreditation and Scope of Accreditation. The scope of the laboratory's accreditation shall include the test methods required by the Contract.

1.10.4 Capability Check

The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

1.10.5 Test Results

Cite applicable Contract requirements, tests or analytical procedures used.

Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify Contracting Officer immediately.

Conspicuously stamp the cover sheet for each report in large red letters

"CONFORMS" or "DOES NOT CONFORM" to the specification requirements,

whichever is applicable. Test results shall be signed by a testing

laboratory representative authorized to sign certified test reports.

Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month.

1.11 QC CERTIFICATIONS

1.11.1 Contractor Quality Control Report Certification

Each daily CQCR shall contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report."

1.11.2 Invoice Certification

Furnish a certificate to the Contracting Officer with each payment request, signed by the QC Manager, attesting that as-built drawings are current, coordinated, and attesting that the work for which payment is requested, including stored material, is in compliance with contract requirements.

1.11.3 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the contract."

1.12 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

1.12.1 Contractor Production Report

Reports are required for each day that work is performed and shall be attached to the CQCR prepared for the same day. This requirement shall commence at the beginning of the construction phase of work and continue through final completion of the contract. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. The CPRs are to be prepared, signed and dated by the project superintendent and

shall contain the following information:

- a. Date of report, report number, name of contractor, Contract number, title and location of Contract and superintendent present.
- b. Weather conditions in the morning and in the afternoon including maximum and minimum temperatures.
- c. Identify work performed by corresponding Schedule Activity No., PC No., Modification No., etc.
- d. A list of Contractor and subcontractor personnel on the work site, their trades, employer, work location, description of work performed, hours worked by trade, daily total work hours on work site this date (including hours on continuation sheets), and total work hours from start of construction.
- e. A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met including the results on the following:
 - (1) Was a job safety meeting held this date? (If YES, attach a copy of the meeting minutes.)
 - (2) Were there any lost time accidents this date? (If YES, attach a copy of the completed OSHA report.)
 - (3) Was crane/manlift/trenching/scaffold/hv electrical/high work/hazmat work done? (If YES, attach a statement or checklist showing inspection performed.)
 - (4) Was hazardous material/waste released into the environment? (If YES, attach a description of incident and proposed action.)
- f. Identify Schedule Activity No. related to safety action and list safety actions taken today and safety inspections conducted.
- g. Identify Schedule Activity No., Submittal No. and list equipment/material received each day that is incorporated into the job.
- h. Identify Schedule Activity No., Owner and list construction and plant equipment on the work site including the number of hours used.
- i. Include a "remarks" section in this report which will contain pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site. For each remark given, identify the Schedule Activity No. that is associated with the remark.

1.12.2 Contractor Quality Control Report (CQCR)

Reports are required for each day that work is performed and for every seven consecutive calendar days of no-work and on the last day of a no-work period. Account for each calendar day throughout the life of the Contract.

The reporting of work shall be identified by terminology consistent with the construction schedule. The CQCRs are to be prepared, signed and dated by the QC Manager and shall contain the following information:

- a. Date of report, report number, name of Contractor, contract number, title, and location of contract.
- b. Indicate if Preparatory Phase work was performed today (Yes/No checkboxes).
- c. If Preparatory Phase work was performed today (including on-site and off-site work), identify its Schedule Activity No. and definable feature of work. The Index No. is a cross reference to the Preparatory Phase Checklist. An example of the Index No. is: 0025-P01, where "0025" is the CQCR Number, "P" indicates Preparatory Phase, and "01" is the Preparatory Phase Checklist number(s) for this date. Each entry in this section must be accompanied with a corresponding Preparatory Phase Checklist.
- d. Indicate if Initial Phase work was performed today (Yes/No checkboxes).
- e. If Initial Phase work was performed today (including on-site and off-site work), identify its Schedule Activity No. and definable feature of work. The Index No. is a cross reference to the Initial Phase Checklist. An example of the Index No. is: 0025-I01, where "0025" is the CQCR Number, "I" indicates Initial Phase, and "01" is the Initial Phase Checklist number(s) for this date. Each entry in this section must be accompanied with a corresponding Initial Phase Checklist.
- f. Results of the Follow-up Phase inspections held today (including on-site and off-site work), including Schedule Activity No., the location of the definable feature of work, Specification Sections, etc. Indicate in the report for this definable feature of work that the work complies with the Contract as approved in the Initial Phase, work complies with health and safety requirements, and that required testing has been performed and include a list of who performed the tests.
- g. List the rework items identified, but not corrected by close of business; along with its associated Schedule Activity Number.
- h. List the rework items corrected from the rework items list along with the corrective action taken and its associated Schedule Activity Number.
- i. Include a "remarks" section in this report which will contain pertinent information including directions received, quality control problem areas, deviations from the QC plan, construction deficiencies encountered, QC meetings held, acknowledgement that as-built drawings have been updated, corrective direction given by the QC Organization and corrective action taken by the Contractor. For each remark given, identify the Schedule Activity No. that is associated with the remark.
- j. CQCR certification, signature and date.

1.12.3 Reports from the QC Specialist(s)

Reports are required for each day that work is performed in their area of responsibility. QC specialist reports shall include the same documentation requirements as the CQCR for their area of responsibility. QC specialist reports are to be prepared, signed and dated by the QC specialists and shall be attached to the CQCR prepared for the same day.

1.12.4 Testing Plan and Log

As tests are performed, the QC Manager shall record on the "Testing Plan and Log" the date the test was conducted, the date the test results were forwarded to the Contracting Officer, remarks and acknowledgement that an accredited or Contracting Officer approved testing laboratory was used. Attach a copy of the updated "Testing Plan and Log" to the last daily CQCR of each month.

1.12.5 Rework Items List

The QC Manager shall maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item will be corrected by, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the "Rework Items List" to the last daily CQCR of each month. The Contractor shall be responsible for including on this list items needing rework including those identified by the Contracting Officer.

1.12.6 As-Built Drawings

The QC Manager is required to ensure the as-built drawings, required by the Basic Contract, are kept current on a daily basis and marked to show deviations which have been made from the contract drawings. Ensure each deviation has been identified with the appropriate modifying documentation (e.g. PC No., Modification No., Request for Information No., etc.). The QC Manager shall initial each deviation and each revision. Upon completion of work, the QC Manager shall furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

1.12.7 Report Forms

The following forms, are acceptable for providing the information required by the paragraph entitled "Documentation." While use of these specific formats are not required, any other format used shall contain the same information:

- a. Combined CPR and CQCR (1 sheet).
- b. Testing Plan and Log.
- c. Rework Items List.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

CONTRACTOR PRODUCTION REPORT <small>(ATTACH ADDITIONAL SHEETS IF NECESSARY)</small>						DATE Enter Date (DD/MMM/YY)	
CONTRACT NO. Enter Cnt# Here		TITLE AND LOCATION Enter Title and Location of Construction Contract Here				REPORT NO. Enter Report # Here	
CONTRACTOR Enter The Contractor's Company Name Here				SUPERINTENDENT Enter Superintendent's Name Here			
AM WEATHER Enter AM Weather Data Here		PM WEATHER Enter PM Weather Data Here		MAX TEMP (F) Enter Max Temp Here		MIN TEMP (F) Enter Min Temp Here	
WORK PERFORMED TODAY							
Schedule Activity No.	WORK LOCATION AND DESCRIPTION		EMPLOYER	NUMBER	TRADE		HRS
JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (If YES attach copy of the meeting minutes) <input type="checkbox"/> YES <input type="checkbox"/> NO			TOTAL WORK HOURS ON JOB SITE, THIS DATE, INCL CONT SHEETS			
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (If YES attach copy of completed OSHA report) <input type="checkbox"/> YES <input type="checkbox"/> NO			CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT			
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLD/HV ELEC/HIGH WORK/HAZMAT WORK DONE? (If YES attach statement or checklist showing inspection performed.) <input type="checkbox"/> YES <input type="checkbox"/> NO			TOTAL WORK HOURS FROM START OF CONSTRUCTION				
WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? (If YES attach description of incident and proposed action.) <input type="checkbox"/> YES <input type="checkbox"/> NO							
Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED						<input type="checkbox"/> SAFETY REQUIREMENTS HAVE BEEN MET.
EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATE SCHEDULE ACTIVITY NUMBER)							
Schedule Activity No.	Submittal #	Description of Equipment/Material Received					
CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.							
Schedule Activity No.	Owner	Description of Construction Equipment Used Today (incl Make and Model)	Hours Used				
Schedule Activity No.	REMARKS						
_____ CONTRACTOR/SUPERINTENDENT				_____ DATE			

CONTRACTOR QUALITY CONTROL REPORT (ATTACH ADDITIONAL SHEETS IF NECESSARY)				DATE Enter (DD/MMM/YY)	
REPORT NO		Enter Rpt # Here			
PHASE	CONTRACT NO Enter Cnt# Here	CONTRACT TITLE Enter Title and Location of Construction Contract Here			
PREPARATORY	WAS PREPARATORY PHASE WORK PERFORMED TODAY? YES <input type="checkbox"/> NO <input type="checkbox"/> IF YES, FILL OUT AND ATTACH SUPPLEMENTAL PREPARATORY PHASE CHECKLIST.				
	Schedule Activity No.	Definable Feature of Work	Index #		
INITIAL	WAS INITIAL PHASE WORK PERFORMED TODAY? YES <input type="checkbox"/> NO <input type="checkbox"/> IF YES, FILL OUT AND ATTACH SUPPLEMENTAL INITIAL PHASE CHECKLIST.				
	Schedule Activity No.	Definable Feature of Work	Index #		
FOLLOW-UP	WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE? YES <input type="checkbox"/> NO <input type="checkbox"/> WORK COMPLIES WITH SAFETY REQUIREMENTS? YES <input type="checkbox"/> NO <input type="checkbox"/>				
	Schedule Activity No.	Description of Work, Testing Performed & By Whom, Definable Feature of Work, Specification Sección, Location and List of Personnel Present			
REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)		REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)			
Schedule Activity No.	Description	Schedule Activity No.	Description		
REMARKS (Also Explain Any Follow-Up Phase Checklist Item From Above That Was Answered "NO", Manuf. Rep On-Site, etc.)					
Schedule Activity No.	Description				
On behalf of the contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report. <div style="display: flex; justify-content: space-between; margin-top: 5px;"> AUTHORIZED QC MANAGER AT SITE DATE </div>					
GOVERNMENT QUALITY ASSURANCE REPORT					
DATE					
QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT					
Schedule Activity No.	Description				
GOVERNMENT QUALITY ASSURANCE MANAGER DATE					

GOVERNMENT QUALITY ASSURANCE (QA) REPORT (ATTACH ADDITIONAL SHEETS IF NECESSARY)					DATE Enter Date (DD/MMM/YY)	
CONTRACT NO Enter Cnt# Here		TITLE AND LOCATION Enter Title and Location of Construction Contract Here			REPORT NO Enter Report # Here	
Status	WORKING?	YES <input type="checkbox"/>	NO <input type="checkbox"/>	IF NO, WHY NOT: _____		
WEATHER CONDITIONS: _____						
Check Points		YES <input type="checkbox"/>	NO <input type="checkbox"/>	REMARKS:		
	SUPERINTENDENT ON SITE	<input type="checkbox"/>	<input type="checkbox"/>			
	QC MANAGER ON SITE	<input type="checkbox"/>	<input type="checkbox"/>			
	QC REPORTS CURRENT	<input type="checkbox"/>	<input type="checkbox"/>			
	AS-BUILTS CURRENT	<input type="checkbox"/>	<input type="checkbox"/>			
	SUBMITTALS APPROVED FOR FOR ONGOING WORK	<input type="checkbox"/>	<input type="checkbox"/>			
	DEFICIENCY LIST REVIEWED	<input type="checkbox"/>	<input type="checkbox"/>			
WORK OBSERVED/DEFICIENCIES NOTED/SAFETY ISSUES DISCUSSED/QA TESTS AND RESULTS:						
Schedule Activity No	DESCRIBE OBSERVATIONS					
MEETING/CONFERENCE NOTES (INCLUDING PARTICIPANTS):						
Schedule Activity No.	NOTES					
INSTRUCTIONS GIVEN OR RECEIVED/CONTROVERSIES PENDING:						
Schedule Activity No.	INSTRUCTIONS/CONTROVERSIES					
<div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div>QA REPRESENTATIVE _____</div> <div>DATE _____</div> <div>SUPV INITIALS _____</div> <div>DATE _____</div> </div>						

INITIAL PHASE CHECKLIST		SPEC SECTION Enter Spec Section # Here	DATE Enter Date (DD/MMM/YY)
CONTRACT NO Enter Cnt# Here	DEFINABLE FEATURE OF WORK Enter DFOV Here	SCHEDULE ACT NO. Enter Sched Act ID Here	INDEX # Enter Index# Here
PERSONNEL PRESENT	GOVERNMENT REP NOTIFIED _____ HOURS IN ADVANCE: YES <input type="checkbox"/> NO <input type="checkbox"/>		
	NAME	POSITION	COMPANY/GOVERNMENT
PROCEDURE COMPLIANCE	IDENTIFY FULL COMPLIANCE WITH PROCEDURES IDENTIFIED AT PREPARATORY. COORDINATE PLANS, SPECIFICATIONS, AND SUBMITTALS.		
	COMMENTS: _____		
PRELIMINARY WORK	ENSURE PRELIMINARY WORK IS COMPLETE AND CORRECT. IF NOT, WHAT ACTION IS TAKEN?		
WORKMANSHIP	ESTABLISH LEVEL OF WORKMANSHIP. WHERE IS WORK LOCATED? _____		
	IS SAMPLE PANEL REQUIRED? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	WILL THE INITIAL WORK BE CONSIDERED AS A SAMPLE? YES <input type="checkbox"/> NO <input type="checkbox"/> (IF YES, MAINTAIN IN PRESENT CONDITION AS LONG AS POSSIBLE AND DESCRIBE LOCATION OF SAMPLE) _____		
RESOLUTION	RESOLVE ANY DIFFERENCES.		
	COMMENTS: _____		
CHECK SAFETY	REVIEW JOB CONDITIONS USING EM 385-1-1 AND JOB HAZARD ANALYSIS		
	COMMENTS: _____		
OTHER	OTHER ITEMS OR REMARKS		

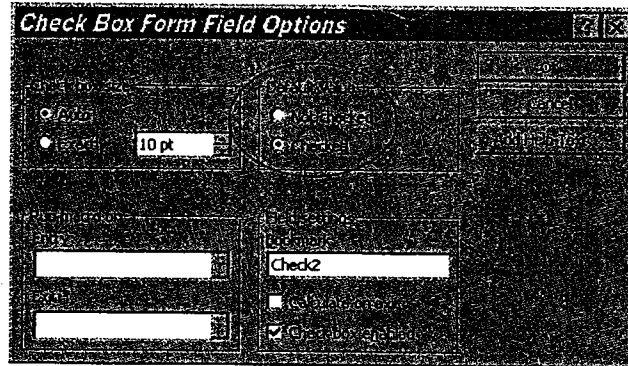
QC MANAGER

DATE

Instructions for Using Report Forms in MS-Word

In the Report Header, fields that have instructional text such as "Enter Title and Location of Construction Contract Here" prompt the user to enter the information in a specific location, governed by the field. Single mouse click anywhere in the field and the field will darken. Entry of text/data at this point will delete the instructional text in the field and will be replaced with entered text/data.

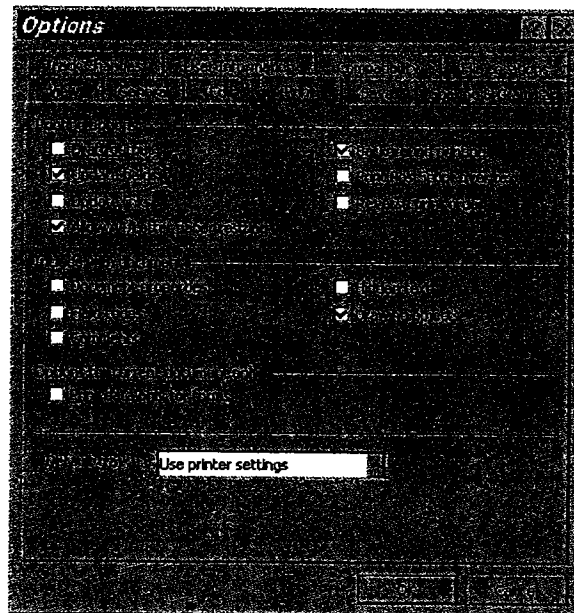
All check boxes are all defaulted as unchecked (i.e., ☐). To check the box (i.e., ☒) , double click the box and the “Check Box Form Field Options” box will appear. In the “Default value” section of the box, click in the Radio Button for “Checked”, then click on the “OK” button and the box will be checked.



The "Hour" fields were intentionally not programmed to total. If the Contractor deleted the formula in a field within the range that was to be totaled, the total would be wrong.

With the ability to [unlimitedly] expand the Contractor Production Report and Contractor Quality Control Representative Report, their Continuation Sheets are obsolete.

In the footer of each form are data fields for the Sheet number and the total number of sheets in the report (Sheet 1 of 2). The first number will generate itself when pages of the report are added. But MS-Word will not automatically update the second number. To update the NumPages field, click the field or the field results and then press F9. You can also click **Options** in the **Tools** menu, click the **Print** tab, and then select the **Update fields** check box.



PREPARATORY PHASE CHECKLIST		SPEC SECTION	DATE
(CONTINUED ON SECOND PAGE)		Enter Spec Section # Here	Enter Date (DD/MMM/YY)
CONTRACT NO	DEFINABLE FEATURE OF WORK	SCHEDULE ACT NO.	INDEX #
Enter Cnt# Here	Enter DFOV Here	Enter Sched Act ID Here	Enter Index# Here
PERSONNEL PRESENT	GOVERNMENT REP NOTIFIED _____ HOURS IN ADVANCE: YES <input type="checkbox"/> NO <input type="checkbox"/>		
	NAME	POSITION	COMPANY/GOVERNMENT
SUBMITTALS	REVIEW SUBMITTALS AND/OR SUBMITTAL REGISTER. HAVE ALL SUBMITTALS BEEN APPROVED? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	IF NO, WHAT ITEMS HAVE NOT BEEN SUBMITTED? _____		
	ARE ALL MATERIALS ON HAND? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	IF NO, WHAT ITEMS ARE MISSING? _____		
MATERIAL STORAGE	CHECK APPROVED SUBMITTALS AGAINST DELIVERED MATERIAL. (THIS SHOULD BE DONE AS MATERIAL ARRIVES.)		
	COMMENTS: _____		
SPECIFICATIONS	ARE MATERIALS STORED PROPERLY? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	IF NO, WHAT ACTION IS TAKEN? _____		
PRELIMINARY WORK & PERMITS	REVIEW EACH PARAGRAPH OF SPECIFICATIONS. _____		
PRELIMINARY WORK & PERMITS	DISCUSS PROCEDURE FOR ACCOMPLISHING THE WORK. _____		
PRELIMINARY WORK & PERMITS	CLARIFY ANY DIFFERENCES. _____		
PRELIMINARY WORK & PERMITS	ENSURE PRELIMINARY WORK IS CORRECT AND PERMITS ARE ON FILE.		
	IF NOT, WHAT ACTION IS TAKEN? _____		

TESTING	IDENTIFY TEST TO BE PERFORMED, FREQUENCY, AND BY WHOM.	
	WHEN REQUIRED?	
	WHERE REQUIRED?	
	REVIEW TESTING PLAN.	
SAFETY	HAS TEST FACILITIES BEEN APPROVED?	
MEETING COMMENTS	ACTIVITY HAZARD ANALYSIS APPROVED? YES <input type="checkbox"/> NO <input type="checkbox"/>	
	REVIEW APPLICABLE PORTION OF EM 385-1-1.	
OTHER ITEMS OR REMARKS	NAVY/ROICC COMMENTS DURING MEETING.	
		QC MANAGER _____ DATE _____

RESPONSIBILITIES/AUTHORITY OF THE QC MANAGER

1. Appointing letter to the QC manager shall detail his/her authority and responsibility to act for the contractor and outline his/her duties, responsibilities and authority. He/she shall have no job-related responsibilities other than QC unless specifically permitted in the specification.
2. He/she shall be on the site at all times during progress of the work, with complete authority to take any action necessary to ensure conformance with the contract requirements. In the event of his/her absence, approved backup shall be on the site.
3. Authority to immediately stop any segment of work which does not comply with the contract plans and specifications and direct the removal and replacement of any defective work.
4. Conduct daily inspection of work performed for compliance with plans and specifications.
5. Certify daily that all materials and equipment delivered/installed in the work comply with contract plans and specifications. Certify daily that all work performed on the construction site and off the construction site conforms to plans and specifications. Report any deficiencies and remedial action planned and taken.
6. Supervise and coordinate the inspection and tests made by the members of the Quality Control Organization, including subcontractors.
7. Assure QC staff is adequate to meet its responsibilities.
8. Maintain a copy of the ROICC approved QC Plan on file at the jobsite complete with up-to-date approved revisions/filled-in log of submittals. Maintain at the jobsite an up-to-date QC Submittal Register (provided in the specification) showing the status of all submittals required by the contract.
9. Maintain at the jobsite a testing plan showing status of all tests required by the contracts. Ensure that all tests required are performed and report the results of same. Indicate whether test results show the item tested conforms to contract requirements or not.
10. Authority to remove any individual from the site who fails to perform his/her work in a skillful and workmanlike manner or his/her work does not comply with the contract plans and specifications.
11. QC manager does not have authority to deviate from plans and specifications without prior approval, in writing, from the ROICC.
12. Ensure that the contractor's Quality Control Organization is adequately staffed with qualified personnel to perform all the detailed inspections and testing specified in the plans and specifications.
13. Maintain at the jobsite the up-to-date QC Rework Items List.

ATTACHMENT A

REWORK ITEMS LIST

Contract No. and Title: **Enter Contract # and Title Here**

Contractor: Enter Contractor's Company Name Here

[illegible]

TESTING PLAN AND LOG

[illegible]

SECTION 01525

SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS
11/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASME INTERNATIONAL (ASME)

- | | |
|-------------|-------------------------------------|
| ASME B30.5 | (2000) Mobile and Locomotive Cranes |
| ASME B30.22 | (2000) Articulating Boom Cranes |

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

- | | |
|-----------------------|---|
| 29 CFR 1910 | Occupational Safety and Health Standards |
| 29 CFR 1910.94 | Ventilation |
| 29 CFR 1910.120 | Hazardous Waste Operations and Emergency Response |
| 29 CFR 1910.146 | Permit-required Confined Spaces |
| 29 CFR 1915 | Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment |
| 29 CFR 1926 | Safety and Health Regulations for Construction |
| 29 CFR 1926.65 | Hazardous Waste Operations and Emergency Response |
| 29 CFR 1926.500 | Fall Protection |
| 29 CFR 1926-SUBPART V | Power Transmission and Distribution |

U. S. ARMY CORPS OF ENGINEERS (USACE)

- | | |
|----------------|--|
| COE EM 385-1-1 | (1996) Safety and Health Requirements Manual |
|----------------|--|

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- | | |
|----------|---|
| NFPA 10 | (2002) Portable Fire Extinguishers |
| NFPA 70 | (2005) National Electrical Code |
| NFPA 241 | (2000) Safeguarding Construction, Alteration, and Demolition Operations |

1.2 SUBMITTALS

Submit the following in accordance with Section C of the basic contract.

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP)

Activity Hazard Analysis (AHA)

Crane Critical Lift Plan

Health and Safety Plan

SD-06 Test Reports

Reports

Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

Accident Reports

Monthly Exposure Reports

Regulatory Citations and Violations

Crane Reports

Certificate of Compliance (Crane)

SD-07 Certificates

Confined Space Entry Permit

Submit one copy of each permit attached to each Daily Quality Control Report.

1.3 DEFINITIONS

a. Certified Industrial Hygienist (CIH). An individual who is currently certified by the American Board of Industrial Hygiene.

b. Certified Safety Professional (CSP). An individual who is currently certified by the Board of Certified Safety Professionals.

c. Health and Safety Plan (HASP). The HASP is the Navy equivalent Army term of SHP or SSHP used in COE EM 385-1-1.

d. High Visibility Accident. Any mishap which may generate publicity and/or high visibility.

e. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

f. Multi-Employer Work Site (MEWS). A MEWS, as defined by OSHA, is one in which many employers occupy the same site. The Government

considers the Contractor to be the "controlling authority" for all work site safety and health of the subcontractors.

g. Operating Envelope. The area surrounding any crane. Inside this "envelope" is the crane, the operator, riggers, rigging gear between the hook and the load, the load and the crane's supporting structure (ground, rail, etc.).

h. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:

- (1) Death, regardless of the time between the injury and death, or the length of the illness;
- (2) Days away from work;
- (3) Restricted work;
- (4) Transfer to another job;
- (5) Medical treatment beyond first aid;
- (6) Loss of consciousness; or
- (7) A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

i. Site Safety and Health Officer (SSHO). The superintendent or other qualified or competent person who is responsible for the on-site safety and health required for the project. The Contractor quality control (QC) person cannot be the SSHO, even though the QC person has safety inspection responsibilities as part of the QC duties.

j. "USACE" property and equipment specified in COE EM 385-1-1 should be interpreted as Government property and equipment.

k. Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.).

1.4 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, work performed shall comply with COE EM 385-1-1, 29 CFR 1910, and 29 CFR 1926. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent

requirements shall apply.

1.5 DRUG and ALCOHOL PREVENTION PROGRAM

Conduct a proactive drug and alcohol use prevention program for all workers, prime and subcontractor, on the site. Ensure that no employees uses illegal drugs or consumes alcohol during work hours. Ensure there are no employees under the influence of drugs or alcohol during work hours. After accidents, collect blood, urine, or saliva specimens and test the injured and involved employees for the influence of drugs and alcohol. A copy of the test shall be made available to the Contracting Officer upon request.

1.6 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.6.1 Personnel Qualifications

1.6.1.1 Site Safety and Health Officer (SSHO)

SSHO shall be provided at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The SSHO shall meet the following requirements:

Level 2:

- A minimum of 3 years safety work on similar project.
- 30-hour OSHA construction safety class or equivalent within last 3 years.
- Competent person training as needed.

1.6.1.2 Certified Safety Professional (CSP) and/or Certified Industrial Hygienist (CIH)

Provide a Contractor employee CSP or CIH at the work site to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor.

1.6.1.3 Competent Person for Confined Space Entry

Provide a competent person meeting the requirements of COE EM 385-1-1 who is assigned in writing by the designated authority to assess confined spaces and who possesses demonstrated knowledge, skill and ability to:

- a. Identify the structure, location, and designation of confined and permit-required confined spaces where work is done;
- b. Calibrate and use testing equipment including but not limited to, oxygen indicators, combustible gas indicators, carbon monoxide indicators, and carbon dioxide indicators, and to interpret accurately the test results of that equipment;
- c. Perform all required tests and inspections specified in 29 CFR 1910.146 and 29 CFR 1915 Subpart B;
- d. Assess hazardous conditions including atmospheric hazards in confined space and adjacent spaces and specify the necessary protection and precautions to be taken;
- e. Determine ventilation requirements for confined space entries and

operations;

f. Assess hazards associated with hot work in confined and adjacent space and determine fire watch requirements; and,

g. Maintain records required.

1.6.1.4 Competent Person for the Health Hazard Control and Respiratory Protection Program

Provide a competent person meeting the requirements of COE EM 385-1-1 who is:

a. Capable by education, specialized training and/or experience of anticipating, recognizing, and evaluating employee exposure to hazardous chemical, physical and biological agents in accordance with COE EM 385-1-1, Section 6.

b. Capable of specifying necessary controls and protective actions to ensure worker health.

1.6.1.5 Crane Operators

Crane operators shall meet the requirements in COE EM 385-1-1, Appendix G.

1.6.2 Personnel Duties

1.6.2.1 Site Safety and Health Officer (SSHO)/Superintendent

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Safety inspection logs shall be attached to the Contractor's daily quality control report.

b. Conduct mishap investigations and complete required reports. Maintain the OSHA Form 300 and Contractor's daily production reports for prime and subcontractors.

c. Maintain applicable safety reference material on the job site.

d. Attend the pre-construction conference, pre-work meetings including preparatory inspection meeting, and periodic in-progress meetings.

e. Implement and enforce accepted APPs and AHAs.

f. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. A list of unresolved safety and health deficiencies shall be posted on the safety bulletin board.

g. Ensure subcontractor compliance with safety and health requirements.

Failure to perform the above duties will result in dismissal of the superintendent and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

1.6.2.2 Certified Safety Professional (CSP) and/or Certified Industrial Hygienist (CIH)

- a. Perform safety and occupational health management, surveillance, inspections, and safety enforcement for the project.
- b. Perform as the safety and occupational health "competent person" as defined by COE EM 385-1-1.
- c. Be on site at least weekly whenever work or testing is being performed.
- d. Conduct and document safety inspections.
- e. Shall have no other duties other than safety and occupational health management, inspections, and enforcement on this contract.

If the CSP and/or CIH is appointed as the SSHO all duties of that position shall also be performed.

1.6.3 Meetings

1.6.3.1 Preconstruction Conference

- a. The SSHO shall attend the preconstruction conference required by Section 01115N, "General Paragraphs (Remedial Action Contracts)" and the basic contract.
- b. The purpose of the preconstruction conference is for the Contractor and the Contracting Officer's representatives to become acquainted and explain the functions and operating procedures of their respective organizations and to reach mutual understanding relative to the administration of the overall project's APP before the initiation of work.
- c. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the superintendent, SSHO, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the APP (including the AHAs and special plans, program and procedures associated with it).
- d. The Contractor shall discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, a schedule for the preparation, submittal, review, and acceptance of AHAs shall be established to preclude project delays.
- e. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and resubmit it for acceptance.

1.6.3.2 Weekly Safety Meetings

Conduct weekly safety meetings at the project site for all employees. The Contracting Officer will be informed of the meeting in advance and be allowed attendance. Minutes showing contract title, signatures of attendees and a list of topics discussed shall be attached to the Contractor's daily quality control report.

1.6.3.3 Work Phase Meetings

The appropriate AHA shall be reviewed and attendance documented by the Contractor at the preparatory, initial, and follow-up phases of quality control inspection. The analysis should be used during daily inspections to ensure the implementation and effectiveness of safety and health controls.

1.7 TRAINING

1.7.1 New Employee Indoctrination

New employees (prime and subcontractor) will be informed of specific site hazards before they begin work. Documentation of this orientation shall be kept on file at the project site.

1.7.2 Periodic Training

Provide safety and health training in accordance with COE EM 385-1-1 and the accepted APP. Ensure all required training has been accomplished for all onsite employees.

1.7.3 Training on Activity Hazard Analysis (AHA)

Prior to beginning a new phase, training will be provided to all affected employees to include a review of the AHA to be implemented.

1.7.4 NDW-IH Special Safety Requirements

The work at NDW-IH is within a restricted area and is potentially hazardous due to danger from explosives. Safety shall be given particular emphasis. Contract Clause "FAR 52.236-13, Accident Prevention, Alternate I" is applicable.

Extraordinary safety regulations for the restricted area include the following:

- a. Liquid petroleum gas and explosives are prohibited.
- b. Specific routes to the jobsite will be designated. Do not deviate from these routes or leave the jobsite area to enter other areas of the station without permission from the Contracting Officer.
- c. Matches and lighters are prohibited in the restricted area. Give matches and lighters to the security personnel at the gate prior to entering the area.
- d. Obey all roadblocks, signs, and gates at entrances to the restricted area. Obtain a clearance in Building 307 to enter the restricted area.
- e. Do not operate mobile or fixed transmitters of radio frequency in

the restricted area identified by road signs.

- f. Do not smoke in the restricted area, except at locations designated by the Contracting Officer. Existing road signs identify "No Smoking" areas.

1.7.5 Station Permits

In accordance with Section 01115N, "General Paragraphs (Remedial Action Contracts)."

1.8 ACCIDENT PREVENTION PLAN (APP)

The Contractor shall use a qualified person to prepare the written site-specific APP. APP shall be incorporated into the HASP. Prepare the APP in accordance with the format and requirements of COE EM 385-1-1 and as supplemented herein. Cover all paragraph and subparagraph elements in COE EM 385-1-1, Appendix A, "Minimum Basic Outline for Preparation of Accident Prevention Plan". Where a paragraph or subparagraph element is not applicable to the work to be performed indicate "Not Applicable" next to the heading. Specific requirements for some of the APP elements are described in the paragraph entitled "COE EM 385-1-1 Contents". The APP shall be job-specific and shall address any unusual or unique aspects of the project or activity for which it is written. The APP shall interface with the Contractor's overall safety and health program. Any portions of the Contractor's overall safety and health program referenced in the APP shall be included in the applicable APP element and made site-specific. The Government considers the Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated SSHO and any designated CSP and/or CIH.

Submit the APP to the Contracting Officer 15 calendar days prior to start of work at the job site. Work cannot proceed without an accepted APP. The Contracting Officer reviews and comments on the Contractor's submitted APP and accepts it when it meets the requirements of the contract provisions.

Once accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer, superintendent, SSHO and quality control manager. Should any unforeseen hazard become evident during the performance of work, the superintendent shall inform the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, all necessary action shall be taken by the Contractor to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment.

Copies of the accepted APP will be maintained at the Contracting Officer's

office and at the job site. The APP shall be continuously reviewed and amended, as necessary, throughout the life of the contract. Unusual or high-hazard activities not identified in the original APP shall be incorporated in the APP as they are discovered.

1.8.1 COE EM 385-1-1 Contents

In addition to the requirements outlines in Appendix A of COE EM 385-1-1, the following is required:

a. Names and qualifications (resumes including education, training, experience and certifications) of all site safety and health personnel designated to perform work on this project to include the designated SSHO and other competent and qualified personnel to be used such as CSPs and/or CIHs. The duties of each position shall be specified.

b. Qualifications of competent and of qualified persons. As a minimum, competent persons shall be designated and qualifications submitted for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; personal protective equipment and clothing to include selection, use and maintenance.

c. Confined Space Entry Plan. Develop a confined space entry plan in accordance with COE EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, and any other federal, state and local regulatory requirements identified in this contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by Contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

d. Health Hazard Control Program. The Contractor shall designate a competent and qualified person to establish and oversee a Health Hazard Control Program in accordance with COE EM 385-1-1, Section 6. The program shall ensure that employees, on-site Government representatives, and others, are not adversely exposed to chemical, physical and biological agents and that necessary controls and protective actions are instituted to ensure health.

e. Crane Critical Lift Plan. Prepare and sign weight handling critical lift plans for lifts over 75 percent of crane hoist's maximum load limit; lifts involving more than one crane or hoist; lifts of personnel; and technically difficult lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks in accordance with COE EM 385-1-1, paragraph 16.c.18. and submit 15 calendar days prior to on-site work.

f. Alcohol and Drug Abuse Plan

(1) Describe plan for random checks and testing with pre-employment screening in accordance with the DFAR Clause subpart 252.223-7004, "Drug Free Work Force."

(2) Description of the on-site prevention program

g. Fall Protection and Prevention (FP&P) Plan. The FP&P shall be site specific and address all fall hazards in the work place and during different phases of construction. It shall address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A qualified person shall prepare and sign the FP&P. The FP&P shall include fall protection and prevention systems, equipment and methods employed for every phase of work, responsibilities, rescue and escape equipment and operations, training requirements, and monitoring methods. FP&P shall be revised every six months for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. The accepted FP&P shall be kept and maintained at the job site for the duration of the project.

h. Site Safety, Health and Emergency Response Plan. Conform to COE EM 385-1-1, paragraph 01.E and include a map denoting the route to the nearest emergency care facility with emergency telephone numbers. Contractor may be required to demonstrate emergency response.

i. Training Records and Requirements. List of mandatory training and certifications which are applicable to this project (e.g. explosive actuated tools, confined space entry, fall protection, crane operation, vehicle operator, forklift operators, personal protective equipment); list of requirements for periodic retraining/certification; outline requirements for supervisory and employee safety meetings.

1.9 ACTIVITY HAZARD ANALYSIS (AHA)

The Activity Hazard Analysis (AHA) format shall be in accordance with COE EM 385-1-1. AHA shall be incorporated into the HASP. Submit the AHA to the Contracting Officer at least 15 calendar days prior to the start of each phase. Format subsequent AHA as amendments to the APP. An AHA will be developed by the Contractor for every operation involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or subcontractor is to perform work. The AHA must identify and evaluate hazards and outline the proposed methods and techniques for the safe completion of each phase of work. At a minimum, define activity being performed, sequence of work, specific safety and health hazards anticipated, control measures (to include personal protective equipment) to eliminate or reduce each hazard to acceptable levels, equipment to be used, inspection requirements, training requirements for all involved, and the competent person in charge of that phase of work. For work with fall hazards, including fall hazards associated with scaffold erection and removal, identify the appropriate fall arrest systems. For work with materials handling equipment, address safeguarding measures related to materials handling equipment. For work requiring excavations, include requirements for safeguarding excavations. An activity requiring an AHA shall not proceed until the AHA has been accepted by the Contracting Officer's representative and a meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activity, including on-site Government representatives. The Contractor shall document meeting attendance at the preparatory, initial, and follow-up phases of quality control inspection. The AHA shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations. The AHA should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

The AHA list will be reviewed periodically (at least weekly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

AAHA shall be updated as necessary to provide an effective response to changing work conditions and activities. The on-site superintendent, SSHO and competent persons used to develop the AHAs, including updates, shall sign and date the AHAs before they are implemented.

1.10 HEALTH AND SAFETY PLAN (HASP)

Allow 30 calendar days for review by Naval Environmental Health Center for health hazard review and Naval Facilities Engineering Command, Engineering Field Division (EFD) or Engineering Field Activity (EFA) construction safety manager. The Contracting Officer will act on the HASP only after 30 day NEHC and EFD/EFA safety manager reviews.

Provide a site specific HASP prepared in accordance with the following:

- a. Section 01115N, "General Paragraphs (Remedial Action Contracts)."
- b. 29 CFR 1910.
- c. 29 CFR 1926.65 (b) (4) (ii).
- d. 29 CFR 1926-SUBPART V, tagout and lockout procedures.
- e. Contract Clause "FAR 52.236-13, Accident Prevention."
- f. Contract Clause "FAR 52.223-3, Hazardous Material Identification and Material Safety Data."
- g. NFPA 241.

HASP shall incorporate AHA as specified in paragraph titled "Activity Hazard Analysis (AHA)". AHA shall be prepared to satisfy the requirements of COE EM 385-1-1 Sections 1.01.A.09 and 1.01.A.10. AHA shall be used to satisfy the HASP requirement for a risk or hazard analysis for each site task and activity, as specified in 29 CFR 1926 Section 65(b) (4) (ii) (A). Site work activities will not be permitted to commence until the HASP and the AHA have been reviewed and accepted by the Contracting Officer in accordance with COE EM 385-1-1 Section 1.A.09.b.

In accordance with COE EM 385-1-1, Health and Safety Requirements, Section 28.B.01.f, a "project SSHP may be considered to satisfy the requirement for an Accident Prevention Plan if the SSHP covers all of the elements required of an accident prevention plan" (as specified in COE EM 385-1-1 Section 28.B.01.a).

1.10.1 Contents

In addition to the requirements of COE EM 385-1-1, Table 28-1, the HASP must include:

- a. Location, size, and details of control areas.
- b. Location and details of decontamination systems.
- c. Interface of trades involved in the construction.

- d. Sequencing of work.
- e. Disposal plan.
- f. Sampling protocols.
- g. Testing laboratories.
- h. Protective equipment.
- i. Pollution control.
- j. Evidence of compliance with 29 CFR 1910.120 and 29 CFR 1926.65.
- k. Training and certifications of CIH, CSP or other competent persons.

1.11 DISPLAY OF SAFETY INFORMATION

Within seven calendar days after commencement of work, erect a safety bulletin board at the job site. The following information shall be displayed on the safety bulletin board in clear view of the on-site construction personnel, maintained current, and protected against the elements and unauthorized removal:

- a. Map denoting the route to the nearest emergency care facility.
- b. Emergency telephone numbers.
- c. Copy of the most up-to-date APP.
- d. AHA(s).
- e. OSHA 300A Form.
- f. Confined space entry permit.
- g. A sign indicating the number of hours worked since last lost workday accident.
- h. OSHA Safety and Health Protection-On-The-Job Poster.
- i. Safety and Health Warning Posters.

1.12 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the paragraph entitled "References." Maintain applicable equipment manufacturer's manuals.

1.13 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.

1.14 REPORTS

1.14.1 Accident Reports

a. For recordable injuries and illnesses, and property damage accidents resulting in at least \$2,000 in damages, the Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the Navy Contractor Significant Incident Report (CSIR) form and provide the report to the Contracting Officer within five calendar day(s) of the accident. The Contracting Officer will provide copies of any required or special forms.

b. For a WHE accident the Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the WHE Accident Report form and provide the report to the Contracting Officer within 30 calendar days of the accident. The Contracting Officer will provide a blank copy of the accident report form.

1.14.2 Accident Notification

Notify the Contracting Officer as soon as practical, but not later than four hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than \$2,000, or any WHE accident involving an overturned crane, collapsed boom, or any other major damage to the crane or adjacent property. Information shall include Contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, personal protective equipment (PPE) used, etc.). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on site and Government investigation is conducted.

1.14.3 Monthly Exposure Reports

Monthly exposure reporting to the Contracting Officer is required to be attached to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. The Contracting Officer will provide copies of any special forms.

1.14.4 Regulatory Citations and Violations

Contact the Contracting Officer immediately of any OSHA or other regulatory agency inspection or visit, and provide the Contracting Officer with a copy of each citation, report, and Contractor response. Correct violations and citations promptly and provide written corrective actions to the Contracting Officer.

1.14.5 Crane Reports

Submit crane inspection reports required in accordance with COE EM 385-1-1, Appendix H and as specified herein with Daily Reports of Inspections.

1.14.6 Certificate of Compliance

The Contractor shall provide a Certificate of Compliance for each crane entering an activity under this contract (see Contracting Officer for a

blank certificate). Certificate shall state that the crane and rigging gear meet applicable OSHA regulations (with the Contractor citing which OSHA regulations are applicable, e.g., cranes used in construction, demolition, or maintenance shall comply with 29 CFR 1926 and COE EM 385-1-1 Section 16 and Appendix H. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. The Contractor shall also certify that all of its crane operators working on the activity have been trained in the proper use of all safety devices (e.g., anti-two block devices). These certifications shall be posted on the crane.

1.15 HOT WORK

Prior to performing "Hot Work" (welding, etc.) or operating other flame-producing devices, a written permit shall be requested from the Fire Department. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. The Contractor will provide at least two twenty pound 4A:20 BC rated extinguishers for normal "Hot Work". All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity.

- a. Oil painting materials (paint, brushes, empty paint cans, etc.), and all flammable liquids shall be removed from the facility at quitting time. All painting materials and flammable liquids shall be stored outside in a suitable metal locker or box and will require re-submittal with non-hazardous materials.
- b. Accumulation of trays, paper, shavings, sawdust, boxes and other packing materials shall be removed from the facility at the close of each workday and such material disposed of in the proper containers located away from the facility.
- c. The storage of combustible supplies shall be a safe distance from structures.
- d. Area outside the facility undergoing work shall be cleaned of trash, paper, or other discarded combustibles at the close of each workday.
- e. All portable electric devices (saws, sanders, compressors, extension cord, lights, etc.) shall be disconnected at the close of each workday. When possible, the main electric switch in the facility shall be deactivated.
- f. When starting work in the facility, Contractors shall require their personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Department telephone number (301-744-4333). ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO THE FIRE DEPARTMENT IMMEDIATELY.

PART 2 PRODUCTS

2.1 CONFINED SPACE SIGNAGE

The Contractor shall provide permanent signs integral to or securely attached to access covers for new permit-required confined spaces. Signs wording: "DANGER--PERMIT-REQUIRED CONFINED SPACE - DO NOT ENTER -" in bold letters a minimum of one inch in height and constructed to be clearly

legible with all paint removed. The signal word "DANGER" shall be red and readable from 5 feet.

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

The Contractor shall comply with COE EM 385-1-1, NFPA 241, the APP, the AHA, the HASP, and other related submittals and activity fire and safety regulations.

3.1.1 Hazardous Material Use

Each hazardous material must receive approval prior to being brought onto the job site or prior to any other use in connection with this contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material. Any work or storage involving hazardous chemicals or materials must be done in a manner that will not expose Government or Contractor employees to any unsafe or unhealthful conditions. Adequate protective measures must be taken to prevent Government or Contractor employees from being exposed to any hazardous condition that could result from the work or storage. The Contractor shall keep a complete inventory of hazardous materials brought onto the work-site. Approval by the Contracting Officer of protective measures and storage area is required prior to the start of the work.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with COE EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials.

3.1.3 Unforeseen Hazardous Material

If hazardous material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to Contract Clauses "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least 15 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Once approved, and prior to beginning work on the utility system requiring shut down, the Contractor shall attend a pre-outage coordination meeting with the Contracting Officer and the Station Utilities Department to review the scope of work and the lock-out/tag-out procedures for worker

protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 EQUIPMENT

3.3.1 Material Handling Equipment

- a. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.
- b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.
- c. Operators of forklifts or power industrial trucks shall be licensed in accordance with OSHA.

3.3.2 Weight Handling Equipment

- a. Cranes must be equipped with:
 - (1) Load indicating devices (LIDs) and a boom angle or radius indicator,
 - (2) or load moment indicating devices (LMIs).
 - (3) Anti-two block prevention devices.
 - (4) Boom hoist hydraulic relief valve, disconnect, or shutoff (stops hoist when boom reaches a predetermined high angle).
 - (5) Boom length indicator (for telescoping booms).
 - (6) Device to prevent uncontrolled lowering of a telescoping hydraulic boom.
 - (7) Device to prevent uncontrolled retraction of a telescoping hydraulic boom.
- b. The Contractor shall notify the Contracting Officer 15 days in advance of any cranes entering the activity so that necessary quality assurance spot checks can be coordinated. Contractor's operator shall remain with the crane during the spot check.
- c. The Contractor shall comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Erection shall be performed under the supervision of a designated person (as defined in ASME B30.5). All testing shall be performed in accordance with the manufacturer's recommended procedures.
- d. The Contractor shall comply with ASME B30.5 for mobile and locomotive cranes, and ASME B30.22 for articulating boom cranes.
- e. The presence of Government personnel does not relieve the Contractor of an obligation to comply with all applicable safety regulations. The Government will investigate all complaints of unsafe or unhealthful working conditions received in writing from Contractor

employees, federal civilian employees, or military personnel.

f. Each load shall be rigged/attached independently to the hook/master-link in such a fashion that the load cannot slide or otherwise become detached. Christmas-tree lifting (multiple rigged materials) is not allowed.

g. Under no circumstance shall a Contractor make a lift at or above 90% of the cranes rated capacity in any configuration.

h. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and shall follow the requirements of COE EM 385-1-1 Section 11 and ASME B30.5 or ASME B30.22 as applicable.

i. Crane suspended personnel work platforms (baskets) shall not be used unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Personnel shall not be lifted with a line hoist or friction crane.

j. A fire extinguisher having a minimum rating of 10BC and a minimum nominal capacity of 5 pound of extinguishing agent shall be available at all operator stations or crane cabs. Portable fire extinguishers shall be inspected, maintained, and recharged as specified in NFPA 10, Standard for Portable Fire Extinguishers.

k. All employees shall be kept clear of loads about to be lifted and of suspended loads.

l. A WHE operator shall not leave his position at the controls while a load is suspended.

m. Only Contractor crane operators who have met the requirements of 29 CFR 1910.94, 29 CFR 1910.120, 29 CFR 1926.65, 29 CFR 1926.500, COE EM 385-1-1, ASME B30.5, and ASME B30.22 and other local and state requirements shall be authorized to operate the crane.

n. The Contractor shall use cribbing when performing lifts on outriggers.

o. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

p. A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.

q. A substantial and durable rating chart containing legible letters and figures shall be provided with each crane and securely mounted onto the crane cab in a location allowing easy reading by the operator while seated in the control station.

r. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by Contracting Officer personnel.

s. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available

for review by Contracting Officer personnel.

t. The Contractor shall certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

3.3.3 Equipment and Mechanized Equipment

a. Equipment shall be operated by designated qualified operators. Proof of qualifications shall be kept on the project site for review.

b. Manufacturer's specifications or owner's manual for the equipment shall be on site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or COE EM 385-1-1. Such additional safety precautions or requirements shall be incorporated into the AHAs.

c. Equipment and mechanized equipment shall be inspected in accordance with manufacturer's recommendations for safe operation by a competent person prior to being placed into use.

d. Daily checks or tests shall be conducted and documented on equipment and mechanized equipment by designated competent persons.

3.4 EXCAVATIONS

The competent person for excavations performed as a result of contract work shall be on-site when excavation work is being performed, and shall inspect, and document the excavations daily prior to entry by workers. The competent person must evaluate all hazards, including atmospheric, that may be associated with the work, and shall have the resources necessary to correct hazards promptly.

3.4.1 Utility Locations

Prior to digging, the appropriate digging permit must be obtained. All underground utilities in the work area must be positively identified by a private utility locating service in addition to any station locating service and coordinated with the station utility department. Any markings made during the utility investigation must be maintained throughout the contract.

3.4.2 Utility Location Verification

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. Digging within 2 feet of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility the utility shall be exposed by hand digging every 100 feet if parallel within 5 feet of the excavation.

3.4.3 Utilities with Concrete Slabs

Utilities located within concrete slabs or pier decks, bridges, and the like are extremely difficult to identify. The location must be coordinated with station utility departments in addition to a private locating service.

Outages on system utilities shall be used in circumstances where concrete chipping, saw cutting, or core drilling is required and utilities are

unable to be completely identified.

3.4.4 Shoring Systems

Trench and shoring systems must be identified in the accepted HASP and AHA. Manufacturer's tabulated data and specifications or registered engineer tabulated data for shoring or benching systems shall be readily available on site for review. Job-made shoring or shielding shall have the registered professional engineer stamp, specifications, and tabulated data. Extreme care must be used when excavating near direct burial electric underground cables.

3.4.5 Trenching Machinery

Trenching machines with digging chain drives shall be operated only when the spotters/laborers are in plain view of the operator. Operator and spotters/laborers shall be provided training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Documentation of the training shall be kept on file at the project site.

3.5 ELECTRICAL

3.5.1 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the Contracting Officer and station utilities for identification. The Contracting Officer will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers shall be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. Insulating blankets, hearing protection, and switching suits may be required, depending on the specific job and as delineated in the AHA.

3.5.2 Portable Extension Cords

Portable extension cords shall be sized in accordance with manufacturer ratings for the tool to be powered and protected from damage. All damaged extension cords shall be immediately removed from service. Portable extension cords shall meet the requirements of NFPA 70.

3.6 WORK IN CONFINED SPACES

The Contractor shall comply with the requirements in Section 06.I of COE EM 385-1-1 and OSHA 29 CFR 1910.146. Any potential for a hazard in the

confined space requires a permit system to be used.

- a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 06.I.05 of COE EM 385-1-1 for entry procedures.) All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.
- b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.
- c. Ensure the use of rescue and retrieval devices in confined spaces greater than 5 feet in depth. Conform to Sections 06.I.09, 06.I.10 and 06.I.11 of COE EM 385-1-1.
- d. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.
- e. Include training information for employees who will be involved as entrants and attendants for the work. Conform to Section 06.I.06 of COE EM 385-1-1.
- f. Daily Entry Permit. Post the permit in a conspicuous place close to the confined space entrance.

3.7 CRYSTALLINE SILICA

Grinding, abrasive blasting, and foundry operations of construction materials containing crystalline silica, shall comply with OSHA regulations, such as 29 CFR 1910.94, and COE EM 385-1-1, Appendix C. The Contractor shall develop and implement effective exposure control and elimination procedures to include dust control systems, engineering controls, and establishment of work area boundaries, as well as medical surveillance, training, air monitoring, and PPE.

3.8 HOUSEKEEPING

3.8.1 Clean-Up

All debris in work areas shall be cleaned up daily or more frequently if necessary. Construction debris may be temporarily located in an approved location, however garbage accumulation must be removed each day.

-- End of Section --

SECTION 01575N

TEMPORARY ENVIRONMENTAL CONTROLS

03/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 112	Oil Pollution Prevention
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management Systems: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administrated Permit Programs: The Hazardous Waste Permit Program
40 CFR 271	Requirements for Authorization of State Hazardous Waste Programs
40 CFR 272	Approved State Hazardous Waste Management

Programs

40 CFR 273	Universal Waste Management
40 CFR 279	Used Oil Regulations
40 CFR 280	Owners and Operators of Underground Storage Tanks
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 355	Emergency Planning and Notification
40 CFR 372-SUBPART D	EPA Toxic Chemical Release Reporting Regulations
49 CFR 171	General Information, Regulations and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shipments and Packagings
49 CFR 178	Packagings

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)

COMAR 26.13	Department of the Environment, Disposal of Controlled Hazardous Substances
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NAVAL DISTRICT WASHINGTON, INDIAN HEAD (NDW-IH)

IHDIV-NSWC 5090.2D	Hazardous Waste Management Plan
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1.2 DEFINITIONS

1.2.1 Sediment

Soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.2 Solid Waste

Garbage, refuse, debris, sludge, or other discharged material (except hazardous waste as defined in paragraph entitled "Hazardous Waste" or hazardous debris as defined in paragraph entitled "Hazardous Debris"), including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations. Material not regulated as solid waste are: nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

- a. Green waste: The vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, shrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.
- b. Surplus soil: Existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included.
- c. Inert construction and demolition debris: Broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may be reinforced with or contain ferrous wire, rods, accessories and weldments.
- d. Wood: Dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated and/or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included.
- e. Scrap metal: Scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe and wire that are recovered or collected and disposed as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.
- f. Paint cans: Metal cans that are empty of paints, solvents, thinners and adhesives. If permitted by the paint can label, a thin dry film may remain in the can.
- g. Recyclables: Materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans may not be included as recyclable if sold to a scrap metal company.

1.2.3 Debris

Non-hazardous solid material generated during the construction, demolition, or renovation of a structure which exceeds 2.5 inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.4 Hazardous Debris

As defined in paragraph entitled "Debris" of this section, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) per 40 CFR 261 or COMAR 26.13; or debris that exhibits a characteristic of hazardous waste per 40 CFR 261 or COMAR 26.13.

1.2.5 Chemical Wastes

This includes salts, acids, alkalies, herbicides, pesticides, and organic chemicals.

1.2.6 Garbage

Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2.7 Hazardous Waste

Any discarded material, liquid, solid, or gas, which meets the definition of hazardous material, is designated hazardous waste by the Environmental Protection Agency (EPA) as defined in 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 271, 40 CFR 272, 40 CFR 273, 40 CFR 279, 40 CFR 280, or is designated hazardous waste as defined in COMAR 26.13.

1.2.8 Oily Waste

Petroleum products and bituminous materials.

1.2.9 Regulated Waste

Those solid waste that have specific additional Federal, state, or local controls for handling, storage, or disposal.

1.2.10 Class I Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of the Clean Air Act and includes the following chemicals:

chlorofluorocarbon-11 (CFC-11)	chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-12 (CFC-12)	chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-13 (CFC-13)	chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-111 (CFC-111)	chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-112 (CFC-112)	chlorofluorocarbon-217 (CFC-217)
chlorofluorocarbon-113 (CFC-113)	halon-1211
chlorofluorocarbon-114 (CFC-114)	halon-1301
chlorofluorocarbon-115 (CFC-115)	halon-2402
chlorofluorocarbon-211 (CFC-211)	carbon tetrachloride
chlorofluorocarbon-212 (CFC-212)	methyl chloroform

1.2.11 Hazardous Materials

Any material that is defined in 49 CFR 171, listed in 49 CFR 172, and regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.120, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261 or COMAR 26.13. Throughout this specification, hazardous material includes hazardous chemicals.

1.3 SUBMITTALS

Submit the following in accordance with Section C of the Basic Contract.

SD-01 Preconstruction Submittals

Environmental Protection Plan

Sediment and Erosion Control Plan

SD-06 Test Reports

Laboratory analysis

SD-11 Closeout Submittals

Some of the records listed below are also required as part of other submittals. For the "Records" submittal, maintain on-site a separate three-ring Environmental Records binder and submit at the completion of the project. Make separate parts to the binder corresponding to each of the applicable subitems listed below.

Solid waste disposal permit

Waste determination documentation

Disposal documentation for hazardous and regulated waste

Contractor 40 CFR employee training records

Regulatory notification

Erosion and sediment control inspection reports

Solid waste disposal report

Contractor Hazardous Material Inventory Log

1.4 CONTRACTOR PREPARED SEDIMENT AND EROSION CONTROL PLAN

The Contractor shall prepare a sediment and erosion control plan for this project. The plan shall include as a minimum:

- (1) An F size graphic plan of the construction site with the location and description of all sediment and erosion control measures proposed.
- (2) The sequence of construction to be followed.
- (3) Graphic details of all sediment and erosion control measures to be used in this project.
- (4) An approval sign-off block.

The approval sign-off block shall contain the following:

Contractors Sediment and Erosion Control Point of Contact:

Date	Printed Name	Signature
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NDW-IH Sediment and Erosion Control Point of Contact:

Signatures below indicates plan approval:

Date	Printed Name	Signature
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1.4.1 Contractor Prepared Sediment and Erosion Control Plan

Submit one copy of the proposed Sediment and Erosion Control Plan for approval by the Contracting Officer prior to performing any earth disturbing activities.

1.4.2 Approved Sediment and Erosion Control Plan

Submit three copies of the approved Sediment and Erosion Control Plan to the Contracting Officer prior to performing any earth disturbing activities.

The Contractor shall strictly follow the Sediment and Erosion Control Plan and maintain all measures used during construction.

1.4.3 Modification to Approved Sediment and Erosion Control Plan

The Contractor may propose modifications to the Sediment and Erosion Control Plan at any time. The Contractor shall submit all modifications to the Contracting Officer and to MDE for approval. No modification to the Sediment and Erosion Control Plan will be allowed until these changes have been approved by the Contracting Officer and MDE and three copies of the approved modifications have been submitted to the Contracting Officer and one copy of the approved modifications have been submitted to MDE.

1.5 LABORATORY ANALYSIS

Submit a copy of a laboratory analysis of solid waste and debris with the potential of becoming classified as a hazardous waste (i.e., abrasive/sand blasting debris, etc.). Waste stream determinations are required at the point of generation and must sufficiently document whether the waste will be a solid waste, hazardous waste, or Resource Conservation and Recovery Act (RCRA) exempt waste. Determinations must use EPA approved methods and provide written rationale for whether the waste is classified as hazardous or non-hazardous. The Contractor shall bear the cost of the waste stream determinations, and the Contracting Officer reserves the right to request waste stream determinations on questionable waste streams.

1.6 REPORTS

1.6.1 Solid Waste Disposal Permit

Submit one copy of a state and local permit or license showing such agencies' approval of the disposal plan before transporting wastes off Government property.

1.6.2 Waste Determination Documentation

The Contractor shall complete a Waste Determination form (provided at the pre-construction conference) for all Contractor derived wastes to be generated. The waste determination must be based upon either a constituent listing from the manufacturer used in conjunction with consideration of the process by which the waste was generated, EPA approved analytical data, or laboratory analysis (MSDS by themselves are not adequate). All support documentation must be attached to the Waste Determination form. As a minimum, a Waste Determination form must be provided for the following wastes (this listing is not all inclusive): oil and latex based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and all containers of the original materials.

1.6.3 Disposal Documentation for Hazardous and Regulated Waste

Submit a copy of the applicable EPA and state permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities.

1.6.4 Contractor 40 CFR Employee Training Records

Prepare and maintain employee training records throughout the term of the contract meeting applicable 40 CFR requirements. The Contractor shall ensure every employee completes a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures compliance with Federal, state and local regulatory requirements for RCRA Large Quantity Generator. The Contractor shall provide a Position Description for each employee, by subcontractor, based on the Davis-Bacon Wage Rate designation or other equivalent method, evaluating the employee's association with hazardous and regulated wastes. This Position Description shall include training requirements as defined in 40 CFR 265 for a Large Quantity Generator facility. Submit these training records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

1.6.5 Regulatory Notification

The Contractor is responsible for all regulatory notification requirements in accordance with Federal, state and local regulations. The Contractor shall forward copies to the Contracting Officer prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all inclusive): demolition, renovation, NPDES defined site work, remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.6.6 Erosion and Sediment Control Inspection Reports

Submit "Erosion and Sediment Control Inspection Reports" (form provided at the pre-construction conference) to the Contracting Officer once every seven calendar days and within 24 hours of a storm event that produces 0.5 inch or more of rain.

1.6.7 Solid Waste Disposal Report

Monthly the Contractor shall submit a solid waste disposal report to the Contracting Officer. For each waste, the report shall state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste. The

Contractor shall include copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, the Contractor may submit a statement indicating the disposal location for the solid waste which is signed by an officer of the Contractor firm authorized to legally obligate or bind the firm. The sales documentation or Contractor certification shall include the receiver's tax identification number and business, EPA or state registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained by the Contractor for his own use, the Contractor shall submit on the solid waste disposal report the information previously described in this paragraph. Prices paid or received shall not be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

1.7 WHM/HW MATERIALS PROHIBITION

No waste hazardous material (WHM) or hazardous waste (HW) shall be disposed of on Government property. No hazardous material shall be brought onto Government property that does not directly relate to requirements for the performance of this contract. The Government is not responsible for disposal of Contractor's waste material brought on the job site and not required in the performance of this contract. The intent of this provision is to dispose of that waste identified as waste hazardous material/hazardous waste as defined herein that was generated as part of this contract and existed within the boundary of the Contract limits and not brought in from offsite by the Contractor. Incidental materials used to support the contract including, but not limited to aerosol cans, waste paint, cleaning solvents, contaminated brushes, rags, clothing, etc. are the responsibility of the Contractor. The list is illustrative rather than inclusive. The Contractor is not authorized to discharge any materials to sanitary sewer, storm drain, or to the river or conduct waste treatment or disposal on Government property without written approval of the Contracting Officer.

1.8 CLASS I ODS PROHIBITION

Class I ODS as defined and identified herein shall not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition shall be considered to prevail over any other provision, specification, drawing, or referenced documents.

1.9 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Environmental Brief: Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the activity; types and quantities of wastes/wastewater that may be generated during the contract.

1.9.1 Facility Hazardous Waste Generator Status

NDW-IH is designated as a Large Quantity Generator. All work conducted within the boundaries of NDW-IH must meet the regulatory requirements of this generator designation. The Contractor shall comply with all provisions of Federal, state and local regulatory requirements applicable to this generator status regarding training and storage, handling, and disposal of all construction derived wastes.

1.9.2 Licenses and Permits

Obtain licenses and permits pursuant to the "Permits and Responsibilities" FAR Clause.

For permits obtained by the Contracting Officer, whether or not required by the permit, the Contractor is responsible to perform quality control inspections of the work in progress, and to submit notifications and certifications to the applicable regulatory agency, via the Contracting Officer, that the work conforms to the contract and permit requirements. The inspections and certifications shall be provided through the services of a Professional Engineer, registered in the state where the work is being performed. As a part of the Quality Control Plan, which is required to be submitted for approval in accordance with Section 01450N, "Quality Control", provide a subitem containing the name, P.E. registration number, address, and telephone number of the professional engineer(s) who will be performing the inspections and certifications for each permit listed above.

1.9.3 Contractor Liabilities for Environmental Protection

The Contractor is advised that this project and NDW-IH are subject to Federal, state, and local regulatory agency inspections to review compliance with environmental laws and regulations. The Contractor shall fully cooperate with any representative from any Federal, state or local regulatory agency who may visit the job site and shall provide immediate notification to the Contracting Officer, who shall accompany them on any subsequent site inspections. The Contractor shall complete, maintain, and make available to the Contracting Officer, station, or regulatory agency personnel all documentation relating to environmental compliance under applicable Federal, state and local laws and regulations. The Contractor shall immediately notify the Contracting Officer if a Notice of Violation (NOV), Notice of Deficiency (NOD), or similar regulatory notice is issued to the Contractor.

The Contractor shall be responsible for all damages to persons or property resulting from Contractor fault or negligence as well as for the payment of any civil fines or penalties which may be assessed by any Federal, state or local regulatory agency as a result of the Contractor's or any subcontractor's violation of any applicable Federal, state or local environmental law or regulation. Should a NOV, Notice of Noncompliance (NON), NOD, or similar regulatory agency notice be issued to the Government as facility owner/operator on account of the actions or inactions of the Contractor or one of its subcontractors in the performance of work under this contract, the Contractor shall fully cooperate with the Government in defending against regulatory assessment of any civil fines or penalties arising out of such actions or inactions.

1.10 FUEL TANKS

On site fuel tanks shall be over drip pans, which shall contain a minimum 110% of the tank's volume. The tanks and drip pans shall be covered during inclement weather and when work is not in progress on the site.

1.11 ENVIRONMENTAL PROTECTION PLAN

Prior to initiating work at the site, the Contractor shall meet with the Contracting Officer to discuss the proposed Environmental Protection Plan and develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken. The Environmental Protection Plan shall be submitted in the following format and shall, at a minimum, address the following elements (also refer to paragraph entitled "Protection of Natural Resources"):

- a. Description of the Environmental Protection Plan
 - (1) General overview and purpose
 - (2) General site information
- b. Protection of Natural Resources
 - (1) Land resources
 - (2) Tree protection
 - (3) Replacement of damaged landscape features
 - (4) Temporary construction
 - (5) Stream crossings
 - (6) Fish and wildlife resources
 - (7) Wetland areas
- c. Protection of Historical and Archaeological Resources
 - (1) Objectives
 - (2) Methods
- d. Stormwater Management and Control
 - (1) Ground cover
 - (2) Erodible soils
 - (3) Temporary measures
 - (a) Mechanical retardation and control of runoff
 - (b) Vegetation and mulch
 - (4) Stormwater Pollution Prevention Plan, Section 01115N, "General Paragraphs (Remedial Action Contracts)."

- e. Prevention of Releases to the Environment
 - (1) Procedures to prevent releases to the environment
 - (2) Notifications in the event of a release to the environment
- f. Protection of the Environment from Waste Derived from Contractor Operations
 - (1) Control and disposal of solid and sanitary waste
 - (2) Control and disposal of hazardous waste (Hazardous Waste Management Section)

This item shall consist of the management procedures for all hazardous waste to be generated. The elements of those procedures shall coincide with the Activity Hazardous Waste Management Plan. A copy of the Activity Hazardous Waste Management Plan will be provided by the Contracting Officer. As a minimum, include the following:

- (a) Procedures to be employed to ensure a written waste determination is made for appropriate wastes which are to be generated;
- (b) Sampling/analysis plan;
- (c) Methods of hazardous waste accumulation/storage (i.e., in tanks and/or containers);
- (d) Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted);
- (e) Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268) and COMAR 26.13;
- (f) Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and the like;
- (g) Used oil management procedures in accordance with 40 CFR 279 and COMAR 26.13;
- (h) Pollution prevention\hazardous waste minimization procedures;
- (i) Plans for the disposal of hazardous waste by permitted facilities;
- (j) Procedures to be employed to ensure all required employee training records are maintained.

1.11.1 Environmental Protection Plan Review

Fourteen days after the environmental protection meeting, submit the proposed Environmental Protection Plan for further discussion, review, and approval. Commencement of work shall not begin until the Environmental Protection Plan has been approved.

1.12 CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG

Submit the "Contractor Hazardous Material Inventory Log" (found at: <http://www.lantdiv.navy.mil/pls/lantdiv/docs/FOLDER/EICO/UFGS/GRAPHICS/01575.pdf>), which provides information required by (EPCRA Sections 312 and 313) along with corresponding MSDS to the Contracting Officer at the start and at the end of construction (30 days from final acceptance), and update no later than January 31 of each calendar year during the life of the contract. Documentation for any spills/releases, environmental reports or off-site transfers may be requested by the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified. Conform to the national permitting requirements of the Clean Water Act.

3.1.1 Land Resources

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor shall be responsible for any resultant damage.

3.1.1.1 Protection of Trees

Protect existing trees which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.

3.1.1.2 Replacement

Remove trees and other landscape features scarred or damaged by equipment operations; and replace with equivalent, undamaged trees and landscape features. Obtain Contracting Officer's approval before replacement.

3.1.2 Water Resources

3.1.2.1 Stream Crossings

The Contracting Officer's approval is required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain Contracting Officer's approval prior to installation. Remove temporary culverts or bridges upon completion of work, and repair the area to its original condition as indicated or as specified.

3.1.2.2 Oily and Hazardous Substances

Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters. In accordance with 40 CFR 112, surround all temporary fuel oil or petroleum storage tanks with a temporary berm or containment of sufficient size and strength to contain the contents of the tanks, plus 10 percent freeboard for precipitation. The berm shall be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.

3.1.3 Fish and Wildlife Resources

Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.

3.1.4 Temporary Construction

Remove traces of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles or excess or waste materials, and other signs of construction. Grade temporary roads, parking areas, and similar temporarily used areas to conform with surrounding contours.

3.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Carefully protect in-place and report immediately to the Contracting Officer historical and archaeological items or human skeletal remains discovered in the course of work. Upon discovery, notify the Contracting Officer. Stop work in the immediate area of the discovery until directed by the Contracting Officer to resume work. The Government retains ownership and control over historical and archaeological resources.

3.3 EROSION AND SEDIMENT CONTROL MEASURES

3.3.1 Burnoff

Burnoff of the ground cover is not permitted.

3.3.2 Borrow Pit Areas

Manage and control borrow pit areas to prevent sediment from entering nearby streams or lakes. Restore areas, including those outside the borrow pit, disturbed by borrow and haul operations. Restoration includes grading, replacement of topsoil, and establishment of a permanent vegetative cover. Uniformly grade side slopes of borrow pit to not more than a slope of 1 vertical to 2 horizontal. Uniformly grade the bottom of the borrow pits to provide a flat bottom and drain by outfall ditches or other suitable means. Stockpile topsoil remove during the borrow pit operation, and use as part of restoring the borrow pit area.

3.3.3 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

3.3.4 Temporary Protection of Erodible Soils

Use the following methods to prevent erosion and control sedimentation:

3.3.4.1 Mechanical Retardation and Control of Runoff

Mechanically retard and control the rate of runoff from the construction site. This includes construction of diversion ditches, benches, berms, and use of silt fences and straw bales to retard and divert runoff to protected drainage courses.

3.3.4.2 Vegetation and Mulch

Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control. The seeding operation shall be as specified in Section 02953, "Trees, Shrubs, Plants, and Grass."

3.4 CONTROL AND DISPOSAL OF SOLID WASTES

Pick up solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged and can be coordinated with the Contracting Officer and the activity recycling coordinator. Remove all solid waste (including non-hazardous debris) from Government property and dispose off-site at an approved landfill. Solid waste disposal off-site must comply with most stringent local, state, and Federal requirements including 40 CFR 241, 40 CFR 243, 40 CFR 258, and COMAR 26.13.

3.5 CONTROL AND DISPOSAL OF HAZARDOUS WASTES

3.5.1 Hazardous Waste/Debris Management

The Contractor shall identify all construction activities which will generate hazardous waste/debris. The Contractor must provide a documented waste determination for all resultant waste streams. Hazardous waste/debris shall be identified, labeled, handled, stored, and disposed in accordance with all Federal, state, and local regulations including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, COMAR 26.13, and IHDIV-NSWC 5090.2D. Hazardous waste shall also be managed in accordance with the approved Hazardous Waste Management Section of the Environmental Protection Plan. Store hazardous wastes in approved containers in accordance with 49 CFR 173, 49 CFR 178, and COMAR 26.13. Hazardous waste generated within the confines of Government facilities shall be identified as being generated by the Government. The Contractor shall dispose of all hazardous waste unless the Contractor cannot accommodate disposal. If the Contractor cannot accommodate disposal the Government may dispose of hazardous waste subject to Contracting Officer approval. Prior to removal of any hazardous waste from Government property, all hazardous waste manifests must be signed by the Property Disposal Office. No hazardous waste shall be brought onto Government property. Provide to the Contracting Officer a copy of waste determination

documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D or COMAR 26.13. For hazardous wastes spills, verbally notify the Contracting Officer immediately.

3.5.1.1 Hazardous Waste Storage/Satellite Accumulation/90 Day Storage Areas

If the work requires the temporary storage/collection of hazardous wastes, the Contractor shall request the establishment of a less than 90 day Hazardous Waste Storage Area or a Satellite Accumulation Area at the point of generation. The Contractor must submit a request in writing to the Contracting Officer providing the following information in advance of generating the hazardous waste:

<u>Contract Number</u>	_____	<u>Contractor</u>	_____
<u>Haz/Waste POC</u>	_____	<u>Telephone Number</u>	_____
<u>Type of Waste</u>	_____	<u>Source of Waste</u>	_____
<u>Emergency POC</u>	_____	<u>Telephone Number</u>	_____
<u>Location of the Site:</u> _____			
(Attach Site Plan to the Request)			

Attach a waste determination form. Allow ten working days for processing this request.

3.5.2 Pollution Prevention/Hazardous Waste Minimization

The Contractor shall actively pursue minimizing the use of hazardous materials and the generation of hazardous waste while on-station. The Hazardous Waste Management Section of the Environmental Protection Plan shall include the Contractor's procedures for pollution prevention/hazardous waste minimization. For preparing this part of the plan, the Contractor may consult the activity Environmental Office for suggestions and to obtain a copy of the installation's pollution prevention/hazardous waste minimization plan for reference material. If no written plan exists, the Contractor may obtain information by contacting the Contracting Officer. The Contractor shall describe the types of the hazardous materials expected to be used in the construction when requesting information.

3.5.3 Hazardous Material Control

The Contractor shall include hazardous material control procedures in the Health and Safety Plan. The procedures shall address and ensure the proper handling of hazardous materials, including the appropriate transportation requirements. The Contractor shall submit a MSDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on station. Typical materials requiring MSDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. At the end of the project, the Contractor shall provide the Contracting Officer with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used. The Contractor shall also ensure that hazardous

materials are utilized in a manner that will minimize the amount of hazardous waste that is generated. The Contractor shall ensure that all containers of hazardous materials have NFPA labels or their equivalent. Copies of the MSDS for hazardous materials shall be kept on site at all times and provided to the Contracting Officer at the end of the project. The Contractor shall certify that all hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste per 40 CFR 261 or COMAR 26.13.

3.5.4 Petroleum Products

Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. All used oil generated on site shall be managed in accordance with 40 CFR 279 and COMAR 26.13. The Contractor shall determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. In addition, used oil containing 1000 parts per million or greater of solvents will be considered a hazardous waste and disposed. Used oil mixed with a hazardous waste shall also be considered a hazardous waste. All hazardous waste shall be managed in accordance with the paragraph entitled "Hazardous Waste/Debris Management" and shall be managed in accordance with the approved Environmental Protection Plan.

3.5.5 Releases/Spills of Oil and Hazardous Substances

Take precautions to prevent releases/spills of oil and hazardous substances. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the NDW-IH Fire Department (301)744-4333, the activity's Command Duty Officer, and the Contracting Officer. The Contractor is responsible for verbal and written notifications as required by 40 CFR 355 and COMAR 26.13, local regulations and Navy Instructions. Spill response shall be in accordance with 40 CFR 300, COMAR 26.13 and applicable state and local regulations. The Contractor shall maintain spill cleanup equipment and materials at the work site. Contain and clean up these spills. If Government assistance is requested or required, the Contractor shall reimburse the Government for such assistance. Provide copies of the written notification and documentation that a verbal notification was made within 20 days. A written follow-up report shall be sent to the Contracting Officer within four hours specifying type and amount of material spilled, cleanup action planned or taken to prevent reoccurrence. After initial investigation by its representatives, the Government may require that the spill reporting required by state and Federal regulations be done by the Contractor. The Contractor shall reimburse the Government for all costs incurred including sample analysis materials, equipment, and labor if the Government must initiate its own spill cleanup procedures, for Contractor responsible spills, when:

- a. The Contractor has not begun spill cleanup procedure within one (1) hour of spill discovery/occurrence, or
- b. If, in the Government's judgment, the Contractor's spill cleanup is not adequately abating life threatening situation and/or is a threat to any body of water or environmentally sensitive areas.

The Contractor shall be responsible for all supplemental written reports and corrective actions required by the MDE for spills resulting from Contractor operations of vehicles. Written reports are required by MDE within 10 calendar days of spill clean up.

3.6 DUST CONTROL

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.7 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted without written permission from the Contracting Officer, and then only during the designated times.

-- End of Section --

SECTION 02223

TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL

04/00

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with Section C of the basic contract.

SD-07 Certificates

Treatment facility permits

SD-11 Closeout Submittals

Shipment manifests

Delivery certificates

Disposal Site Decontamination Certificates

Work Site Decontamination Certificates

Treatment and Disposal Certificates

1.2 QUALITY ASSURANCE

1.2.1 Certificates

1.2.1.1 Treatment Facility Permits

Verification that the proposed treatment facilities are permitted to accept the contaminated materials specified, prior to the start of excavation.

1.2.2 Closeout Submittals

1.2.2.1 Shipment Manifests

Copies of manifests and other documentation required for shipment of waste materials within 24 hours after removal of waste from the site. All shipment manifests, except for hazardous waste manifests, shall be signed by the Contracting Officer. Hazardous waste manifests shall be signed by the Property Disposal Office. The Contractor shall coordinate with the Contracting Officer to obtain these signatures.

1.2.2.2 Delivery Certificates

Verification that the wastes were actually delivered to the approved treatment facility, within 7 days of shipment.

1.2.2.3 Disposal Site Decontamination Certificates

Verification that all vehicles and containers were decontaminated prior to leaving the disposal site, within 7 days of disposal.

1.2.2.4 Work Site Decontamination Certificates

Verification that all vehicles, equipment, and containers were decontaminated prior to leaving the work site shall be submitted within 24 hours of vehicles, equipment, or containers leaving the work site. Verification that all trucks transporting contaminated materials were properly operating, and were covered, shall be submitted within 24 hours after removal of waste from the site.

1.2.2.5 Treatment and Disposal Certificates

Verification that the wastes were successfully treated and remediated to the levels specified herein.

1.2.2.6 Ordnance Explosive Screening Certificates

Verification that the wastes were screened for ordnance and explosives (OE) in accordance with the Explosives Safety Submittal.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 MATERIALS AND EQUIPMENT

The Contractor shall furnish all labor, materials, and equipment necessary to screen, transport and dispose of Government and Contractor generated wastes in accordance with applicable Federal, State, and local requirements.

3.2 SAMPLING

3.2.1 Sampling of Stored Material

Samples of stored material shall be collected at a frequency as required by the disposal facility. Analyses for contaminated material to be taken to an off-site treatment facility shall conform to Federal, State, and local criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the Contracting Officer. Additional sampling and analyses to the extent required by the approved off-site treatment, storage or disposal (TSD) facility shall be the responsibility of the Contractor and shall be subject to approval by the Contracting Officer.

3.2.2 Sampling Liquid

Liquid collected from excavations, storage areas and decontamination facilities shall be sampled at a frequency as required by the disposal facility if disposed off-site. On-site treatment shall be the preferred method if economics prove on-site treatment is more cost effective than off-site disposal. Analyses for contaminated liquid to be taken to an off-site treatment facility shall conform to Federal, State, and local criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the Contracting Officer. Additional sampling and analysis to the extent required by the approved off-site TSD facility receiving the material shall be the responsibility of the Contractor and shall be subject to approval by

the Contracting Officer.

3.3 RECORDS

The Contractor shall originate, use, and maintain the waste shipment records/manifests as required by the Maryland Department of the Environment.

3.4 DECONTAMINATION

The Contractor shall be solely responsible for complying with all Federal, State, and local requirements for decontamination of vehicles, equipment, and containers and shall bear all responsibility and cost for any noncompliance. In addition to those requirements, the Contractor shall perform the following.

- a. Visually inspect all vehicles, equipment, and containers leaving the work site for proper decontamination.
- b. Prepare and maintain a written decontamination log.
- c. Decontamination log shall remain on site at all times for inspection purposes.

3.5 TRANSPORTATION

The Contractor shall be solely responsible for complying with all Federal, State, and local requirements for transporting contaminated materials through the applicable jurisdictions and shall bear all responsibility and cost for any noncompliance. In addition to those requirements, the Contractor shall perform the following:

- a. Inspect and document all vehicles and containers for proper operation and covering.
- b. Inspect all vehicles and containers for proper markings, manifest documents, and other requirements for waste shipment.
- c. Perform and document decontamination procedures prior to leaving the worksite and again before leaving the disposal site.

3.6 DISPOSAL

All contaminated materials removed from the site shall be disposed in a treatment/disposal facility permitted to accept such materials.

-- End of Section --

SECTION 02224

GEOGRAPHIC INFORMATION SYSTEM (GIS)
GRADE-B POST-CONSTRUCTION LOCATION
2/98

PART 1 GENERAL

1.1 REFERENCES

The publication listed below forms a part of this specification to the extent referenced. The publication is referenced to the text by the basic designation only. This publication is provided as Appendix A at the end of this specification section.

NAVAL DISTRICT WASHINGTON, INDIAN HEAD (NDW-IH)

IHDIV-NSWC GIS-DG

Geographic Information System, Drafting
Guidelines

1.2 SYSTEM DESCRIPTION

Provide a survey to locate all new and altered existing surface and subsurface items, including buried utilities, as required by the basic contract including all addendums, change orders, and modifications. Using the data from this GIS survey, provide a CADD file and an F-size mylar reproducible and print which shows these new items including buried utilities. The work required by this specification is a separate item required by the basic contract. It can be used to help update the construction AS-BUILTS drawings, but is not to be considered as such.

1.3 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0, of the basic contract.

SD-11 Closeout Submittals

Buried Utility Location Plan

Survey Report

GIS CADD file(s)

F-Size plot of the CADD file(s)

PART 2 PRODUCTS

2.1 BURIED UTILITY LOCATION PLAN

2.1.1 Description

The plan shall indicate the method that the Contractor and his surveyor shall use to horizontally and vertically locate all new and altered existing surface and subsurface utilities and lines provided as a result of this contract including all change orders, addendums, and modifications. This shall include, but not be limited to, steam lines, fresh and river water pipelines, sanitary and storm sewer pipelines, electrical conduits

and lines, grounding rods and cables, telephone lines, cable television and fiber optic lines, various process pipelines, etc. The plan shall be composed on 8 1/2 inch x 11 inch sheets only. No legal sheets are allowed.

2.1.2 Contents

The plan shall contain as a minimum:

- A cover sheet with the contract title and contract number.
- The company name, address, and telephone number of the Contractor and Project Manager as well as a point of contact for this GIS work.
- The company name, address, and telephone number of the firm performing the survey with the names of the personnel performing the survey.
- A full description of the method to be used for locating all new and altered existing surface and subsurface utilities for the GIS survey.
- The typed or neatly printed name and signature of the Contractor's Project Manager and the Registered Land Surveyor stamping the GIS work.

2.2 SURVEY REPORT

2.2.1 Physical Description

The report shall describe the companies and persons involved with the GIS work required by this specification section as well as providing information on what equipment was used to perform the survey. The report shall be compiled such that it is in one bound unit that may be filed in a standard file cabinet. The report shall be composed on 8 1/2 inch x 11 inch sheets only. No legal sheets are allowed.

2.2.2 Contents

The report shall include as a minimum:

- A cover sheet with the contract title and contract number.
- The company name, address, and telephone number of the firm performing the survey with the names of the personnel performing the GIS survey.
- The date(s) that the GIS survey was performed.
- The make and model of the hardware used to perform the survey.
- The method of data collection with the name and version of the data collection software.
- A hard copy of the field data.
- The company name, address, and telephone number of the firm providing the CADD file with the names of persons creating the file.

- A copy of the Buried Utility Location Plan.

2.3 GIS CADD FILE(S)

2.3.1 Drafting Standards

All CADD files shall be prepared in accordance with IHDIV-NSWC GIS-DG provided as Appendix A at the end of this specification section.

2.3.2 Media

The CADD file(s) shall be submitted on 3 1/2 inch HD diskettes (1.44 MB formatted). The diskettes shall become the property of the Government (NDW-IH) at each submission.

2.3.3 Format

The CADD files shall be provided in the AutoCad (.DWG) R-12 or later version format only. The files shall be read and utilized without conversion or reprocessing with the exception of archiving.

2.3.4 Archiving

The CADD files may be archived for convenience and for space limitations. The files shall be archived using PKZIP software, and shall be able to be unarchived using PKUNZIP. No other means of archival is allowed. A copy of the same version of PKZIP and PKUNZIP used to zip the files shall be included with the zipped files.

2.3.5 Scale

The CADD files shall all be done at FULL scale. The scale is 1.0 (1'-0" = 1'-0").

2.3.6 Orientation

Each CADD file shall be oriented such that all items are located at their true State Plane Coordinate System (SPCS) coordinates. The coordinates shall be in the U.S. Foot measurement using Northing and Easting Coordinates consistent with the SPCS for the State of Maryland (NAD 83). The files shall be oriented such that North is at the top of the screen.

2.3.7 Vector Graphics

The CADD files shall be in vector form only. The files shall be created using vector entities. The use of scanned or digitized files is not allowed. The use of files that have been vectorized from hand drawn, scanned, or digitized drawings is not allowed.

2.3.8 Plot Files

The plot file shall be provided on a 3 1/2 inch HD diskette for each F-Size plot, and shall be identical to the plot of each CADD files submitted.

2.3.9 Multiple Sites

If the project has multiple sites, a separate CADD file shall be made for each site.

2.3.10 Drawing Border and Title Block

The border and title block will be provided by the Government on a 3 1/2 inch diskette.

2.4 F-SIZE PLOT

2.4.1 Description

The Contractor shall provide one mylar reproducible hard copy F-Size plot and four (4) blueprint copies of all new and altered existing surface and subsurface items as a result of this project including all addendums, change orders, and modifications. The plot shall be oriented such that North is at the top of the sheet. All copies required by submittal shall be made from the mylar reproducible from the same submission. The border and title block will be provided by the Government on a 3 1/2 inch diskette.

2.4.2 Items Required on the Plot

The following items shall be included on the plan in addition to the GIS plan:

- The border and title block as provided by the Government.
- The contract number and title.
- The date the CADD file was plotted.
- The scale of the plot and a graphic scale of the scale used to plot the drawing.
- A North arrow.
- A legend of items indicated on the GIS plan.
- The control points used for the survey and their Northing and Easting coordinates and elevations (each point shall be located at its true SPCS location).
- The name and address of the Contractor's firm.
- The name and address of the firm performing the post-construction survey.
- The name and address of the firm producing the GIS CADD file.
- The name and signature of the person preparing the CADD file and plot.
- The stamp and signature of the Registered Land Surveyor (physical imprint on the mylar reproducible only).

2.4.3 Multiple Sites

If the project has multiple sites, a separate F-size sheet shall be made for each site.

PART 3 EXECUTION

3.1 BURIED UTILITY LOCATION PLAN

3.1.1 Procedure

The Buried Utility Location Plan shall be prepared by the Contractor with input from the Contractor's surveyor. The Contractor shall prepare and submit the Buried Utility Location Plan prior to performing any construction work.

3.2 GIS SURVEY

3.2.1 Description

A survey shall be performed by the Contractor to horizontally and vertically locate all new and altered existing surface and subsurface items installed as a result of this contract. The Contractor shall locate all items required by all disciplines of the contract and as required by all change orders, addendums, and modifications. This includes all new or altered underground utilities including, but not limited to, fresh and river water pipelines, sanitary and storm sewer pipelines, electrical conduits and lines, grounding rods and cables, telephone lines, cable television and fiber optic lines, and various process pipelines, etc.

3.2.2 Procedure

The survey shall be performed with a total station. The survey shall initiate at any primary or secondary combined (horizontal and vertical) control point near the construction site and backside one other primary or secondary combined control point in order to provide the correct coordinates, elevations, and orientation. Available control points in the area will be indicated to the surveyor prior to the survey. Should additional turning points be required to complete the survey, a set-up on any other secondary combined control point may be used, or single turning points may be set from these primary or secondary control points. Any number of single turning points, that have been established from a primary or secondary combined control point, may be used to complete the survey. Should it be necessary to set additional turning points due to inaccessible areas, an open and traverse and level run shall be performed that extends from one existing primary or secondary control point to another with a minimum error of closure of 1/5000. Documentation of the open-end traverse and level run shall be included in the survey report.

3.2.3 Horizontal Location Standards

3.2.3.1 Surface and Subsurface Items

Horizontally locate all new or altered existing surface and subsurface items to 0.10 foot of their true SPCS coordinates.

3.2.4 Typical Horizontal Items

The survey shall include, but not be limited to:

3.2.4.1 Corners and Edges

Buildings, pads, dikes, tanks, structures, pavements, roads, parking areas, walks, woodlines, piers, walls, ponds, marshes, rivers, exposed portions of

footings. Buildings shall be located at the corners of the building, not the corners of rooflines. Items indicated with edges such as woodlines, roads, ponds, and shorelines, shall be surveyed such that they provide a reasonable degree of accuracy, to meet the intent of this specification. Woodlines shall be surveyed at the tree-dripline. When shorelines subject to tidal action are required to be surveyed, the shoreline shall be indicated at the Mean High Water (MHW) elevation of 1.42 feet.

3.2.4.2 Lines and Centerlines

Utility lines and pipelines, ditches, fences, overhead transmission lines, steam and air lines, cable trays.

3.2.4.3 Point Entities

Identify the following using symbols: valves, hydrants, poles, ground test pockets, stanchions, signs, trees.

3.2.5 Vertical Location Standards

The survey shall include, but not be limited to:

3.2.5.1 Elevated Items

The elevation of platform decks, top of masts, top of roofs, top of exhaust stacks. The elevation of overhead transmission lines, steam and air lines, and cable trays is not required.

3.2.5.2 Surface Items

The Contractor shall indicate the elevation of all new and altered existing surface and subsurface items to 0.10 foot of their true elevation as determined from the NDW-IH vertical control. Indicate the top and invert elevations of all manholes, catch basin, headwalls, finished floor(s) of buildings, top of slabs, top of curbs, invert of dikes, etc. Indicate the elevation of the top of buried lines at a maximum of 50 feet intervals. Indicate the elevations at all connections to existing utilities, thrust blocks, reducers, changes in direction both horizontally and vertically and terminations.

3.2.5.3 Subsurface Items

The Contractor shall indicate the elevation of all new and altered existing surface and subsurface items to 0.50 feet of their true elevation as determined from the NDW-IH vertical control.

3.2.6 Topography

The survey shall be performed such that the contours can be indicated in one foot increments with no more than one half contour error at any location. Indicate high and low points with spot elevations.

3.2.7 Utility Material and Sizes

The line size and material type of all new and altered existing subsurface piped utilities shall be indicated on the CADD file and on the F-size plot according to the IHDIV-NSWC GIS-DG.

3.3 GIS CADD FILE

At the completion of the survey the CADD file(s) for each site shall be created. The survey points shall be input into the file at their true SPCS coordinates and all items shall be drawn in at their true SPCS horizontal IHDIV-NSWC GIS-DG.

3.4 F-SIZE PLOT

Upon completion of the CADD file, a mylar reproducible F-size plot shall be made to show the contents of each site. The file shall be plotted at full scale 1"=1" (scale = 1.0). Each site may be shown at any of the following scales: 1" = 10', 20', 30', 40', 50', 100', 200', 300', 400', 1000', 2000'.

The plot shall be made such that the GIS plan occupies as much of the page as possible. If extensive GIS plans are required, the use of match lines may be used while maintaining true SPCS coordinates.

3.5 SUBMISSIONS

3.5.1 Buried Utility Location Plan

The Contractor shall prepare and submit four (4) copies of the Buried Utility Location Plan prior to performing any construction work. The plan shall not be considered as an acceptable means of location until approved by the Contracting Officer.

3.5.2 CADD Files and F-Size Plot

3.5.2.1 First Submission

Prepare and submit four (4) copies of the CADD files and F-size plots. Only one mylar reproducible is required per submission. The Contractor shall make the required submission within four weeks after the completion of the post-construction survey.

3.5.2.2 Government Review

The Government shall have two (2) weeks to perform a review of the GIS submissions for compliance with this specification and the IHDIV-NSWC GIS-DG. At the end of two weeks the Contractor shall receive a set of comments detailing the modifications required to be made to the GIS submittals.

3.5.2.3 Government Accuracy Testing

The Government may elect to perform tests to check the accuracy of the post-construction location plan. If the Contractor's plan does not produce results within the indicated accuracy requirements, the Contractor shall perform another survey, correct all errors, and make all necessary changes to reflect the true locations of the individual items at no cost to the Government.

3.5.2.4 Following Submissions

The Contractor shall address all comments indicated by the government. The review process indicated above shall continue until all GIS, Grade-B Post Construction Location submittals are approved by the government. Only when the government approves the GIS submittals shall authorization be made for final payment of the construction contract, notwithstanding other items required by the construction contract.

-- End of Section --

APPENDIX A

INDIAN HEAD DIVISION
NAVAL SURFACE WARFARE CENTER
GEOGRAPHIC INFORMATION SYSTEM/DRAFTING GUIDELINES

**ORIGINAL**

INDIAN HEAD DIVISION NAVAL SURFACE WARFARE CENTER

ENGINEERING DESIGN DIVISION GEOGRAPHIC INFORMATION SYSTEM / DRAFTING GUIDELINES

REVISION 4-3-97 SUPERSEDES ALL PREVIOUS REVISION

NOTE TO USER : THESE BASIC CADD DRAFTING CRITERIA WERE CREATED TO ELIMINATE THE NEED FOR MULTIPLE REVIEWS DUE TO NON COMPLIANT SUBMISSIONS. THE INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER (IHD, NSWC) IS ALSO DEDICATED TO IMPLEMENTATION OF THE TRI-SERVICE CADD STANDARDS THAT ARE BEING DEVELOPED AT THIS TIME.

THESE STANDARDS WILL BE REVIEWED AND MODIFIED AS DEEMED NECESSARY, BY PIV ENGINEERING DESIGN DIV. (IHD, NSWC). ALL DRAFTING AND SPECIFICATION PREPARATION SHALL BE IN ACCORDANCE WITH MIL-HANDBOOK "MIL-HDBK-1006/1" ITEMS LISTED IN THIS ENCLOSURE SHALL SUPERSEDE CADD REQUIREMENTS

1. DRAWINGS WILL BE SPOT CHECKED TO ENSURE COMPLIANCE BY CODE 092 PERSONNEL AT SUBMISSION INTERVALS.
2. ALL DRAWINGS SHALL BE DONE IN CADD FORMAT (.DWG) OR (.DGN) FILES
3. ALL DRAWINGS SHALL BE DONE AT FULL SCALE I.E. 1=1, 1.0.
4. NEW WORK SHALL STAND OUT FROM EXIST BY LINE WEIGHT AS WELL AS BY DESCRIPTION, LINE TYPES SHALL MATCH EXISTING WHERE APPLICABLE.
5. PLOTTED SIZE OF TEXT SHALL BE MIN. OF 1/8 INCH HIGH
6. ALL DRAWINGS, INCLUDING DETAILS SHOULD BE DRAFTED AND PLOTTED AT 1=1.
7. SUBMIT CADD FILES IN DIGITAL FORMAT ON HD DISKETTES AND PLOTS FOR ALL DESIGNS DURING NORMAL REVIEW PROCESS.
8. USE (IHD, NSWC) TITLE SHEETS WHICH ARE AVAILABLE IN (.DWG) OR (.DGN) FORMAT
9. USE C2 TERMINOLOGY RATHER THAN SHEET 2 OF 17

ALL SITE PLANS

1. ALL SITE PLANS SHALL MAINTAIN SPCS, NAD83, USFOOT, ZONE 1900 COORDINATES AS PROVIDED ON ORIGINAL TOPO AND PLANIMETRIC FILES, NOTE: IMPROPER MANIPULATION OF ORIGIN WILL DESTROY ORIGINAL COORDINATES.
2. SITE PLANS SHALL BE DONE BY COMBINING GIS FILES WITH NEW AND EXIST UTILITY FILES; SEE ENCLOSURE (1) LAYER FORMAT.
3. MULTIPLE/ INTERDISCIPLINE SITE PLANS MAY BE USED FOR EASE OF DRAFTING BUT MUST BE COMBINED TO FORM A SINGLE FILE FOR GIS PURPOSES.
4. SITE PLANS SHALL BE PLOTTED TO SCALE USING STANDARD CIVIL ENGINEERING SCALES 1"=10', 20', 30', 40', 50', 60', 100', 200', AND 400'
5. GIS PLANIMETRIC, TOPO, REAL ESTATE AND STORM WATER CADD FILES ARE AVAILABLE AND MAY BE USED FOR STORM WATER WAVIER/DESIGN PURPOSES ONLY. IF PLANIMETRIC FILES ARE USED FOR DESIGN PURPOSES THERE ACCURACY SHALL BE VERIFIED BY SURVEY OR FIELD TAPE. (I.E. APPROXIMATELY TO TRUE LOCATION + OR - 15" ,ROOF OVER HANGS WERE USED FOR BUILDING CORNERS.) IF TOPO IS NEEDED FOR DESIGN PURPOSES, A SURVEY SHOULD BE DONE.
6. ALL ITEMS THAT ARE FOUND TO BE INCORRECTLY SHOWN ON GIS PLANIMETRIC OR TOPO FILES SHALL HAVE THIER LOCATION VERIFIED I.E. SURVEYED OR FIELD TAPED, AND SHALL BE NOTED ON THE EXISTING UTILITY FILE WHERE DESCREPENCIES ARE FOUND.
7. GIS FILES SHALL BE CLEANED UP WHEN USED, I.E. DELETE ROOF ELEVATIONS, STORM DRAIN IDENTIFIERS, CHANGE SIZE OF TEXT TO MATCH PLOT SCALE ETC.

SITE PLANS GIS GRADE A

1. DESIGN DRAWINGS MUST SHOW TEMPORARY CONSTRUCTION BASE LINE THAT IS PART OF TRAVERSE. INDICATE COORDINATES AND ELEVATION.
2. LOCATE ALL BUILDING CORNERS AND STRUCTURES.
3. UTILITIES AND MINOR PLANIMETRIC FEATURES DO NOT NEED TO BE LOCATED DURING THE DESIGN PHASE.
4. PROVIDE NOTE ON DRAWINGS THAT CONSTRUCTION CONTRACTOR MUST LOCATE ALL NEW AND EXISTING WORK WITHIN INDICATED GIS LIMITS; SEE (IHD, NSWG) GUIDE SPEC. SECTION 02223.
5. INDICATE LIMITS OF GIS GRADE A ACCURACY ON DRAWINGS FOR POST CONSTRUCTION SURVEY.

SITE PLANS GRADE B

1. DESIGN DRAWINGS MUST SHOW TEMPORARY CONSTRUCTION BASE LINE AND INDICATE COORDINATES AND ELEVATIONS. BASE LINE MAY BE TAKEN FROM EXISTING PLANIMETRIC FEATURES IDENTIFIED BY "A & E GEOGRAPHIC INFORMATION SYSTEM GUIDELINES". ELEVATIONS MAY BE TAKEN FROM BUILDING PLANT ACCOUNT DATA OR REAL ESTATE FILE.
2. LOCATE (BY DIMENSIONS) ALL NEW BLDGS, STRUCTURE CORNERS AND ANY ITEMS THAT APPEAR IN THE NEW PLANIMETRIC AND UTILITY FILE.
3. PROVIDE NOTE ON DRAWINGS THAT CONSTRUCTION CONTRACTOR MUST LOCATE ALL NEW WORK. SEE (IHD, NSWG) GUIDE SPEC SECTION 02224.
4. AFTER RECEIVING SITE PLAN CONSTRUCTION ASBUILT FROM PROJECT ENGINEER, REDRAW SITE PLAN TO REFLECT PROPER COORDINATES FOR NEW AND EXISTING UTILITY FILES.
5. IF CODE 092 PERSONNEL FIND INCORRECT ITEMS ON PLANIMETRIC OR OTHER ORIGINAL GIS FILES THE ITEM SHOULD BE CORRECTED IN THE EXISTING PLANIMETRIC LAYER OF THE EXISTING UTILITY. IF THESE CORRECTIONS INFLUENCE A&E DESIGNS PRESENTLY UNDER CONTRACT 092 EIC WILL BE NOTIFIED.

FLOOR PLANS AND SECTIONS

1. BUILDING FLOOR PLANS SHOULD BE CONSISTENT BETWEEN ENGINEERING DISCIPLINES AND THE FLOOR PLAN SHALL BE ORIENTED SUCH THAT THE MAIN ENTRANCE IS LOCATED AT THE BOTTOM OF THE SHEET.
2. IF SYMBOLS ARE USED TO REFERENCE NOTES FOR WORK TO BE DONE; THEY SHOULD BE SHOWN ON THE SAME SHEET AS THEY ARE USED.

DETAILS.

1. NEW DETAILS SHALL MEET TRI-SERVICE CADD/GIS TECHNOLOGY CENTERS "GENERIC CADD DETAILS LIBRARY" FORMAT. (SEE ENCLOSURE (2)).
2. NEW DETAILS; IF LARGER THAN 7.36" BY 7.48" SHALL BE IN MULTIPLES OF THIS SIZE.
3. NEW PW STANDARDS SHALL MEET THE REQUIREMENTS OF 1 AND 2 ABOVE.
4. OLD PW STANDARDS SHALL BE RE DRAWN TO MEET THE REQUIREMENTS OF 1 AND 2 ABOVE. CODE 092 PERSONNEL MAY USE PW STANDARDS IN PRESENT FORMAT.
5. AFTER ACCEPTANCE OF FINAL DESIGN, A CADD FILE OF ALL NEW AND CONVERTED PW STANDARDS SHALL BE GIVEN TO CODE 0921 OR 092

DEMOLITION

ALL DEMOLITION WORK SHALL BE IDENTIFIED BY CROSS HATCHING OF THE ITEM TO BE DEMOLISHED, A DEMOLITION LAYER SHALL ALSO BE ADDED TO THE NEW UTILITY FILE.

ABANDONMENT

ALL ABANDONED WORK SHALL BE IDENTIFIED BY PLACING THE ITEM TO BE
ABANDONED ON A ABANDONED LAYER IN THE EXISTING UTILITY FILE,
(ABANDONED —FW—, ETC)

END OF GUIDELINES — SEE FILE SYSTEM ATTACHED (2 SHEETS

NEW UTILITY FILE

NEWUTIL

11/2/94

Description	Layer #	Line Style	style	thickness	color	COMMENTS
AIR	1	—A—	0	4	5	
ELEC PRIMARY LINE	2	—EPL—	0	4	4	
ELEC SECONDARY LINE	3	—ESL—	0	4	5	
FIRE LOOP LINE	4	—FA—	0	4	7	
FRESH WATER	5	—FW—	0	4	3	
FUEL SUPPLY	6	—FS—	0	4	2	oil tanks /piping
GROUNDING	7	—G—	0	4	2	
HYDROGRAPHY	8		0	4	4	swm structures, erosion control
INDUSTRIAL PROCESS	9		0	4	10	process piping tanks
INDUSTRIAL WASTE	10	—IW—	0	4	2	
LAN LINE	11	—LAN—	0	4	8	
OTHER BURIED ITEMS	12		0	4	7	other buried items not listed
PAD MOUNTED XFMR	13		0	4	3	
PLANIMETRIC FEATURES	14		0	4	7	new items shown on gis planimetric file
POLE INCL GUY	15		0	4	1	
POLE MOUNTED XFMR	16		0	4	1	pole mounted transformers
REAL ESTATE/SURVEY	17		0	4	2	control points , data collector
RIVER WATER	18	—RW—	0	4	1	
SANITARY SEWER	19	—S—	0	4	4	
SOILS	20		0	4	1	soil borings
STEAM	21	—ST—	0	4	6	
STORM SEWER	22	—SW—	0	4	5	
TELEPHONE LINE	23	—T—	0	4	6	
TEXT CIVIL	24		0	2	3	general text
TEXT ELEC.	25		0	2	3	
TEXT MECH.	26		0	2	3	
TOPOGRAPHY	27		0	4	8	contours, spot elev.
UG PRIMARY	28	—UGP—	3	4	4	
UG SECONDARY	29	—UGS—	3	4	5	

EXISTING UTILITY FILE

EXSTUTIL

description	layer #	Line Style	style	thickness	color	COMMENTS
AIR	1	—A—	0	2	5	
LEC PRIMARY LINE	2	—EPL—	0	2	4	
ELEC SECONDARY LINE	3	—ESL—	0	2	5	
FIRE LOOP LINE	4	—FA—	0	2	7	
FRESH WATER	5	—FW—	0	2	3	
FUEL SUPPLY	6	—FS—	0	2	2	oil tanks /piping
GROUNDING	7	—G—	0	2	2	
HYDROGRAPHY	8		0	2	4	swr structures, erosion control
INDUSTRIAL PROCESS	9		0	2	10	process piping tanks
INDUSTRIAL WASTE	10	—IW—	0	2	2	
LAN LINE	11	—LAN—	0	2	8	
OTHER BURIED ITEMS	12		0	2	7	other buried items not listed
PAD MOUNTED XFMR	13		0	2	3	
PLANIMETRIC FEATURES	14		0	2	7	new location items on gis planimetric files
POLE INCL GUY	15		0	2	1	
POLE MOUNTED XFMR	16		0	2	1	pole mounted transformers
REAL ESTATE/SURVEY	17		0	2	2	control points, data collector
RIVER WATER	18	—RW—	0	2	1	
SANITARY SEWER	19	—S—	0	2	4	
SOILS	20		0	2	1	soil borings
STEAM	21	—ST—	0	2	6	
STORM SEWER	22	—SW—	0	2	5	
TELEPHONE LINE	23	—T—	0	2	6	
TEXT CIVIL	24		0	2	3	
TEXT ELEC.	25		0	2	3	
TEXT MECH.	26		0	2	3	
TOPOGRAPHY	27		0	2	6	contours, spot elev, -
UG PRIMARY	28	—UGP—	3	2	4	
UG SECONDARY	29	—UGS—	3	2	5	

2 Generic Details Library

Library Creation

"Evolution" is the best description of the process for incorporating the suggested format for creating generic details. Agencies currently developing detail libraries are encouraged to begin incorporating the format into their daily design efforts, not to attempt a complete revamping of their existing detail libraries. As project-specific details are created, they should be included into the agencies' detail library and submitted to the TSTC for inclusion into the DoD-wide master set. By no means should the Generic Details Library ever be considered a completed product. It is only the beginning of what should be a daily routine of adding and revising details for all design disciplines within the Tri-Services.

As more agencies begin developing details in the suggested format, the TSTC will formally request that details be submitted for inclusion into the master set. Once the TSTC has compiled the details, the appropriate Field Working Group will meet to review the submitted details for proper format and applicability prior to field distribution.

Detail Integrity

Although a liability disclaimer covering all the details is included as part of the Generic Details Library, each detail submitted

for inclusion into the library should be reviewed by the submitting agency for integrity and compliance with current design criteria. It will be extremely helpful to the TSTC and the Field Working Groups if each detail is properly reviewed prior to submitting it for placement into the Library.

Creating a Detail

Step 1

When developing a detail, draw the detail at full size (1 in. = 1 in.) first. After the detail is graphically complete, but prior to placing text, dimensions, patterning, leader lines, and terminators, the detail should be scaled to the appropriate final size, such as 3 in. = 1 ft - 0 in. (Figure 1). Table 1 lists the common scales, the type of detail to be drawn for each scale, and the factor by which details drawn at full size should be scaled.

Step 2

After scaling, any hatching or patterning should be placed on the detail (Figure 2). This method ensures that the hatching and patterning for all details, regardless of their scale, will be consistent. (Note for MicroStation users: When dimensioning a scaled detail be sure to set "scale dimension"

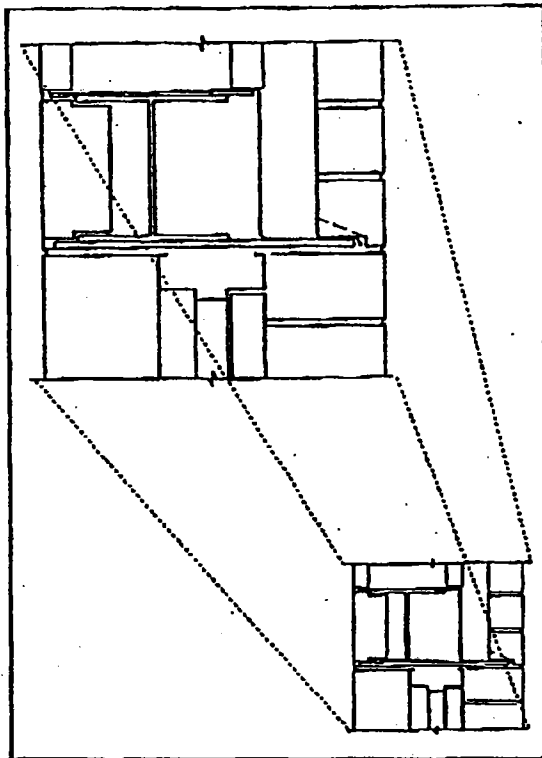


Figure 1. Step 1: draw the detail at full size, then scale per Table 1

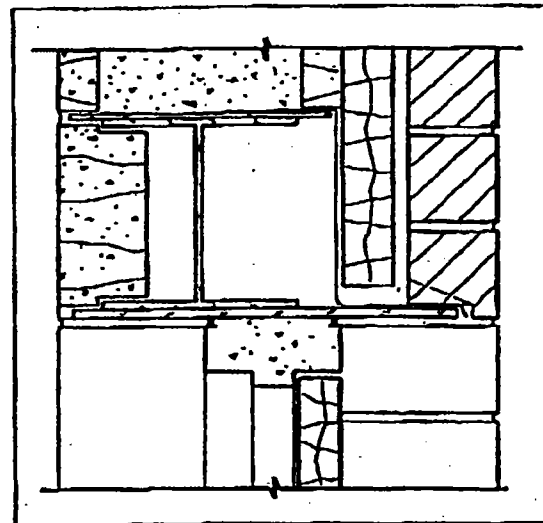


Figure 2. Step 2: add any hatching and patterning to detail

(to ensure that the detail will dimension correctly.)

Step 3

To help ensure a consistent visual clarity to the details, the AAFWG has provided the

Table 1 Scaling Factors		
Detail Type	Common Scales for Details	Factor by Which a Full-Size Detail Should be Scaled
Details	6 in. = 1 ft - 0 in.	6.00
Details	3 in. = 1 ft - 0 in.	3.00
Details	1-1/2 in. = 1 ft - 0 in.	1.50
Details	1 in. = 1 ft - 0 in.	1.00 12.00
Wall Sections	3/4 in. = 1 ft - 0 in.	0.75
Wall Types	1/2 in. = 1 ft - 0 in.	0.50
Large-Scale Plans	1/4 in. = 1 ft - 0 in.	0.25
Floor/Ceiling Plans	1/8 in. = 1 ft - 0 in.	0.125
Composite/Roof Plans	1/16 in. = 1 ft - 0 in.	0.0625

standard detail layout (provided as a cell or block) shown in Figure 3. To utilize the layout form when creating a detail, the designer should place the layout form over the detail at the active scale "as = 1." Once properly positioned and placed over the detail, add the text, leaders, line terminators, and title to the detail as noted on the layout form. Level/layer assignments are listed in Table 2.

Step 4

Once the detail is complete, delete the layout cell/block (Figure 4). The completed detail will then conform to the AAFWG's standard detail size of 187 mm (7.36 in.) by 190 mm (7.48 in.). It is understood that not all details will fit into this typical detail layout (at the scale intended), but this format should be used to the extent possible. For those exceptions, the use of multiple 187-mm by 190-mm grids is encouraged.

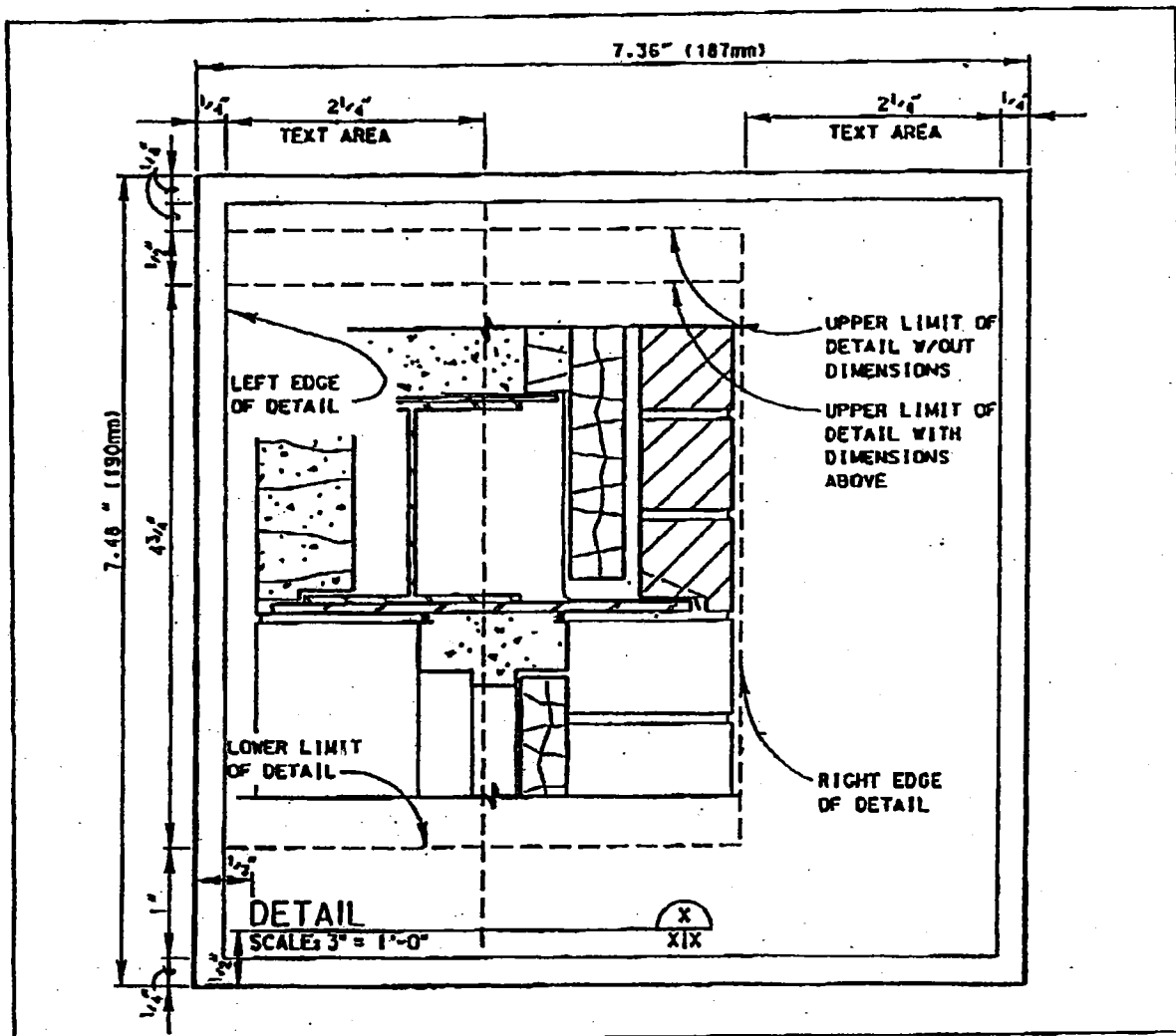


Figure 3. Step 3: position the layout cell/dwg over the detail and add text, dimensions, leader lines, titles, and line terminators

Table 2 Layer Assignments	
Level/Layer	Description
A-DETL-TEXT	Notes, Text, & Dimension Text
A-DETL-SYMB	Symbols, Bubbles, etc.
A-DETL-DIMS	Dimension Linework
A-DETL-NPLT	Sheet Grid
A-DETL-LW10	Detail Linework
A-DETL-LW25	Detail Linework
A-DETL-LW35	Detail Linework
A-DETL-LW50	Detail Linework
A-DETL-LW70	Detail Linework
A-DETL-PATT	Pattern/Hatch

Standard Graphics/Terminology

All graphics and detail terminology should be represented in a consistent manner for detail uniformity and graphic quality. Graphic symbology conventions (including line styles and patterning) used in creating generic details should conform to the material representations as shown in the Architectural Engineering Instructions (AEI) manual *Design Criteria* and/or Engineer Manual EM 1110-1-1807.

Abbreviations

Abbreviations for words or phrases frequently used on the details should be as noted in Appendix A. When possible, abbreviations should be kept to a minimum. Other abbreviations, particularly discipline-unique abbreviations, may be used but must not conflict with those in Appendix A.

Levels/layers

Level/layer separation of the various graphic elements within a detail is necessary to ensure the easy manipulation of details by subsequent users. All details should adhere to the layer assignments in Table 2.

Line widths/weights

The primary purpose of line widths/weights is to provide a drawing with visual depth and clarity or, in some CADD systems, to determine plotted line widths. To accommodate both MicroStation and AutoCAD and to ensure easy translations between systems, line widths (weights) will be determined as specified in the next section, "Color."

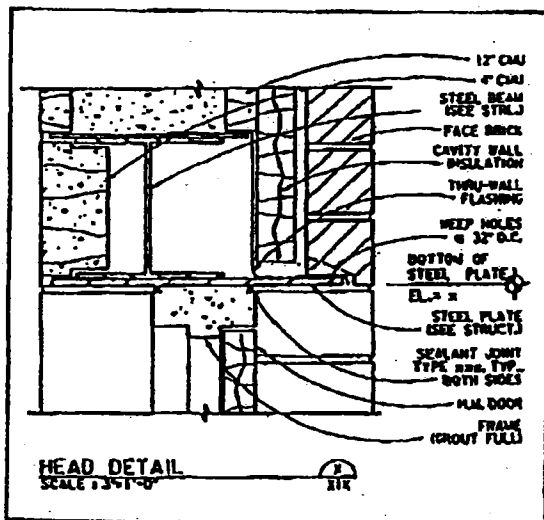


Figure 4. Step 4: remove layout.cel/block to complete

Color

Although final drawings are most often plotted in black and white, colors are prescribed for details to aid the designer in drawing and/or manipulating the details on a computer monitor. To accommodate CADD systems where line color dictates plotted line widths, colors should adhere to Table 3.

Text

The text style for generic details shall be Intergraph's Font 1 as supplied with MicroStation. For AutoCAD users, the "Romans" text style should be used to ensure easy translation between systems. Text for detail notes should be placed at a height of 1-1/2 in. Detail titles should be placed at 2-1/2 in.

Detail naming

For the master set of details, the Construction Specification Institute/Construction Specifications Canada (CSI/CSC) UniFormat-based naming system has been developed. The format for naming individual detail drawing files should follow the eight-character format shown in Figure 5.

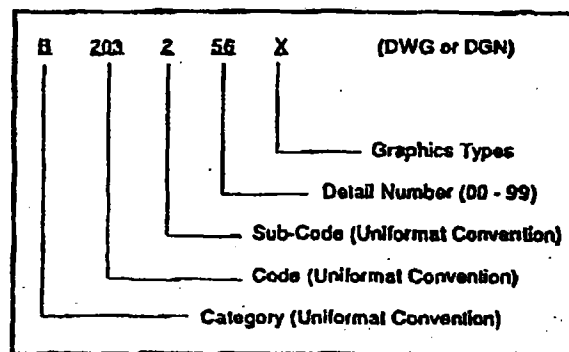


Figure 5. Naming convention. Note: A full listing of Uniformat categories and codes is outlined in Section 5, Index of Details.

Layer Name	Color	AutoCAD Color #	MicroStation Color #	Line/Pen Width
A-DETL-LW10	Cyan	4	7	0.10 mm/0.004 in.
A-DETL-LW25	White	7	0	0.25 mm/0.010 in.
A-DETL-LW35	Yellow	2	4	0.35 mm/0.014 in.
A-DETL-LW50	Magenta	8	5	0.50 mm/0.020 in.
A-DETL-LW70	Blue	5	1	0.70 mm/0.028 in.
A-DETL-TEXT	Green	3	2	0.35 mm/0.014 in.
A-DETL-SYMB	Yellow	2	4	0.35 mm/0.014 in.
A-DETL-DIMS	Cyan	4	7	0.10 mm/0.004 in.
A-DETL-NPLT	Red	1	3	0.10 mm/0.004 in.
A-DETL-PATT	Cyan	4	7	0.10 mm/0.004 in.

SECTION 02315N

EXCAVATION AND FILL
01/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2003) Materials Finer than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 698	(2000a1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D 1140	(2000) Amount of Material in Soils Finer Than the No. 200 (75-Micrometer) Sieve
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4253	(2000) Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D 4254	(2000) Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 5567 (1994; R 2001) Hydraulic Conductivity Ratio (HCR) Testing of Soil/Geotextile Systems

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE EM-385-1-1 (1996) Safety and Health Requirements Manual

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846 (1986) Evaluating Solid Waste (Physical/Chemical Methods)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 261 Identification and Listing of Hazardous Waste

MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE)

MDE SESC (1994) Standards and Specifications for Soil Erosion and Sediment Control

MARYLAND STATE HIGHWAY ADMINISTRATION (MD SHA)

MD SHA CM (2001) Standard Specifications for Construction and Materials

1.2 DEFINITIONS

1.2.1 Regulatory Requirements

Provide work and materials in accordance with applicable requirements of MD SHA CM. Divisions and sections mentioned herein refer to those specifications. Paragraphs in MD SHA CM entitled "Measurement and Payment," shall not apply.

1.2.2 Modification of Reference

Where term "Engineer" is used in MD SHA CM it shall be construed to mean Contracting Officer. Where term "Administration" is used, it shall mean Government.

1.2.3 Cohesive Materials

Materials ASTM D 2487 classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when the fines have a plasticity index greater than zero.

1.2.4 Cohesionless Materials

Materials ASTM D 2487 classified as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.

1.3 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0 of the basic

contract.

SD-02 Shop Drawings

Supporting system drawings

SD-05 Design Data

Supporting system calculations

SD-06 Test Reports

Borrow Site Testing

Common fill and backfill test

Select fill test

Coarse aggregate test

Density tests

SD-07 Certificates

Excavation and handling work plan

Dewatering work plan

Submit 15 days prior to starting work.

1.3.1 Excavation and Handling Work Plan

Provide as part of the Work Plan within 30 calendar days of issuance of the delivery order, and before procurement, fabrication, or mobilization. No work at the site, with the exception of site inspections, clearing, and surveys, shall be performed until this Work Plan is approved. Allow 15 calendar days in the schedule for the Government's review. At a minimum, the Work Plan shall include the following elements as specified in Section 01115N, "General Paragraphs (Remedial Action Contracts)."

- a. Schedule of activities.
- b. Supporting systems to be used.
- c. Method of ordnance and explosive (OE) screening to be used.
- d. Method of excavation and equipment to be used.
- e. Method of compaction and equipment to be used.
- f. Excavation dewatering plan.
- g. Decontamination procedures.
- h. Spill contingency plan.

1.4 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

1.5 CRITERIA FOR PROPOSAL

Base proposals on the following criteria:

- a. Surface elevations are as indicated.
- b. Pipes or other artificial obstructions, except those indicated, will not be encountered.
- c. Ground water elevations indicated by the boring and groundwater monitoring well logs and indicated in the Basis of Design Report were those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction. Logs are provided in Appendix A of the Basis of Design Report. Drawing elevations reference National Geodetic Vertical Datum, 1929 (NGVD1929).
- d. Blasting will not be permitted. Remove material in an approved manner.
- e. Waste and fill material may contain cartridge activated devices (CAD) or other OE items.
- f. Hazardous waste characteristics shall be determined based on the requirements in 40 CFR 261, Subpart C.

1.6 REQUIREMENTS FOR OFF SITE SOIL

Soils and aggregates brought in from off-site shall be tested for total petroleum hydrocarbon - diesel range organics (TPH-DRO), total petroleum hydrocarbon - gasoline range organics (TPH-GRO), sum of benzene, toluene, ethylbenzene, and xylene (BTEX), characteristic waste determination (ignitability, corrosivity, reactivity, and toxicity), and Table 1 parameters. Soils and aggregates shall contain less than 1 part per million (ppm) TPH-DRO, less than 1 ppm TPH-GRO, less than 1 ppm of the sum of BTEX, shall not fail the tests for characteristic waste (ignitability, corrosivity and reactivity), and shall have concentrations less than the 40 CFR 261.24 maximum concentrations for the toxicity characteristic. The Contracting Officer will review Table 1 parameter results for acceptance based on risk based criteria. TPH-DRO shall be determined using EPA SW-846 8015M DRO, TPH-GRO shall be determined using EPA SW-846 8015M GRO, BTEX shall be determined using EPA SW-846 Method 5030 / 8021, characteristic waste determination shall be performed in accordance with the requirements of 40 CFR 261 Subpart C, characteristic of toxicity shall be performed in accordance with EPA SW-846 Method 1311 (i.e. TCLP), TAL metals shall be determined using EPA SW-846 6010B, TCL volatile organic compounds shall be determined using EPA SW-846 8260B, TCL semivolatile organic compounds shall be determined using EPA SW-846 8270C, TCL pesticides shall be determined using EPA SW-846 8081A, and polychlorinated biphenyls shall be determined using EPA SW-846 8082. Provide borrow site testing from a composite sample of material from the borrow site, with at least one test from each borrow site. Material shall not be brought on-site until tests have been approved by the Contracting Officer.

1.7 QUALITY ASSURANCE

1.7.1 Required Drawings

Submit drawings and calculations by a registered professional engineer. Drawings shall include material sizes and types, arrangement of members, and the sequence and method of installation and removal.

1.7.2 Required Data

Submit drawings and calculations by a registered professional engineer. Calculations shall include data and references used.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

Free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and frozen, deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

2.1.1 Common Fill

Off-site borrow. ASTM D 2487, classification GW, GP, GM, GC, SW, SC with a maximum ASTM D 4318 liquid limit of 35, maximum ASTM D 4318 plasticity index of 12, maximum of 25 percent by weight passing ASTM D 1140, No. 200 sieve, and a maximum particle size of 1 inch or ASTM D 2487, classification CL with maximum particle size of 1 inch. Maximum particle size of common fill in contact with geomembrane or within 6-inches of geomembrane shall be 1/2-inch.

2.1.2 Backfill Material

ASTM D 2487, classification GW, GP, GM, SW, SP, SM with a maximum ASTM D 4318 liquid limit of 35, maximum ASTM D 4318 plasticity index of 12, maximum of 25 percent by weight passing ASTM D 1140, No. 200 sieve, and a maximum particle size of 1 inch.

2.1.3 Select Fill

ASTM D 2487 classification SC, SC-SM, or CL-ML with a maximum particle size of 1 inch, d_{85} greater than 0.10 mm (where d_{85} is the soil particle size for which 85 percent of the soil is finer). Select fill shall not indicate either piping or clogging when tested with top geotextile of the selected geocomposite drainage layer in accordance with ASTM D 5567.

2.1.4 Topsoil

Provide as specified in Section 02953, "Trees, Shrubs, Plants, and Grass."

2.1.5 Select Landfill Material

Free of debris, sharp objects, deleterious materials, or other objectionable materials with a maximum particle size of 3 inches.

2.1.6 Coarse Aggregate

MD SHA CM Section 901.01, Table 901A crusher run aggregate CR-6, graded

aggregate-base design range, or coarse aggregate-Portland cement concrete, or ASTM D 2487 classification GW or GP.

2.1.7 CR-6 Coarse Aggregate

MD SHA CM Section 901.01, Table 901A crusher run aggregate CR-6.

2.1.8 No. 67 Coarse Aggregate

MD SHA CM Section 901.01, Table 901A coarse aggregate-portland cement concrete, 67.

2.1.9 Sand

Uniformly graded sandy soil with ASTM D 2487 coefficient of uniformity less than 3 or well graded sandy soil with ASTM D 2487 coefficient of uniformity greater than 4 and ASTM D 2487 coefficient of curvature greater than 1 and less than 3; and maximum particle size of 1/2 inch.

2.2 BORROW

Obtain borrow materials required in excess of those furnished from excavations from sources outside of Government property.

2.3 BURIED WARNING AND IDENTIFICATION TAPE

Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Yellow:	Electric
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems
White:	Steam Systems

2.3.1 Warning Tape for Metallic Piping

Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.3.2 Detectable Warning Tape for Non-Metallic Piping

Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape

is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.4 DETECTION WIRE FOR NON-METALLIC PIPING

Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

2.5 MATERIAL FOR RIP-RAP

MD SHA CM Section 901.02.01, Class I and Section 901.03.

2.6 MATERIAL FOR GABIONS

MD SHA CM Sections 901.05, 906.01.01, and 906.01.02, Federal Standard 595, green color.

PART 3 EXECUTION

3.1 ORDNANCE AND EXPLOSIVE SCREENING

Perform OE screening in accordance with the approved Explosives Safety Submittal.

3.2 SURFACE PREPARATION

3.2.1 Clearing and Grubbing

Unless indicated otherwise, remove above-ground vegetation including trees, stumps, logs, shrubs, and brush within the indicated landfill limits. Remove stumps entirely. Grub out matted roots and roots over 2 inches in diameter to at least 18 inches below existing ground surface unless otherwise indicated. Cleared and grubbed vegetation from within the landfill limits shall be disposed off-site. Clearing, grubbing, and topsoil stripping shall be performed in the remaining area within the limits of disturbance but outside the indicated landfill limits. Topsoil from outside the landfill limits shall be stripped to a depth of approximately 6 inches and stockpiled for use during site restoration activities.

3.2.2 Unsuitable Material

Remove vegetation, debris, decayed vegetable matter, sod, mulch, and rubbish underneath paved areas or concrete slabs.

3.2.2.1 Proof Rolling

Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. Proof roll the landfill surface after clearing and grubbing and prior to placement of regraded material with a 40,000 pound (minimum) track type tractor with a minimum ground contact pressure of 8.0 psi. Operate the equipment in a systematic manner to ensure 200 percent coverage is provided over all areas, and at speeds between 2 1/2 to 3 1/2 miles per hour. Notify the Contracting Officer a minimum of 3 days prior to proof rolling. Proof rolling shall be performed in the presence of the Contracting Officer. Subgrade that ruts or pumps shall be undercut as directed by the Contracting Officer and replaced with common fill material.

3.3 PROTECTION

3.3.1 Protection Systems

Provide shoring and bracing in accordance with COE EM-385-1-1.

3.3.2 Drainage and Dewatering

Provide for the collection, treatment, and disposal when required of surface and subsurface water encountered during construction. Submit a Dewatering Work Plan. On-site treatment, when required, shall be the preferred method if economics prove on-site treatment is more cost effective than off-site disposal.

3.3.2.1 Drainage

So that construction operations progress successfully, completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/construct storm drainage features at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and groundwater conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.3.2.2 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval by the Contracting Officer, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material.

While the excavation is open, the water level shall be maintained continuously, at least one foot below the working level or to the depth required to provide a safe excavation, stable working surface, stable side slopes, and to permit verification sampling when required. Dewatering requirements may be waived and materials and requirements of the paragraphs entitled "Coarse Aggregate" and "Coarse Aggregate Placement" used, subject to the approval of the Contracting Officer, for depth interval where it is impractical to assure the water level is maintained per this paragraph. Perform all dewatering activities in accordance with MDE SESC.

Operate dewatering system continuously until construction work below existing water levels is complete. All water shall be containerized and tested to determine proper disposal requirements, when required.

3.3.3 Underground Utilities

Location of the existing utilities indicated is approximate. The

Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor shall contact the Contracting Officer for assistance in locating existing utilities. The Contractor shall scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered.

3.3.4 Machinery and Equipment

Movement of construction machinery and equipment over pipes during construction shall be at the Contractor's risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged.

3.4 EXCAVATION

Horizontal extent and base of landfill material indicated are estimated based on existing subsurface data. Commence excavation only after OE screening has been performed. Excavate and consolidated or dispose off-site landfill material outside of indicated limits and outside of indicated engineered cap limits.

Excavate to contours, elevation, and dimensions indicated. Reuse excavated materials that meet the specified requirements for the material type required at the intended location. Keep excavations free from water. Excavate material disturbed or weakened by Contractor's operations, materials softened or made unsuitable for subsequent construction due to exposure to weather. Refill with common fill material and compact to 90 percent of ASTM D 1557 maximum density unless indicated otherwise. Refill excavations cut below indicated depth with common fill material and compact to 90 percent of ASTM D 1557 maximum density unless indicated otherwise.

3.4.1 Pipe Trenches

Excavate to the dimension indicated. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement.

3.5 FILLING AND BACKFILLING

Fill and backfill to contours, elevations, and dimensions indicated. Compact each lift before placing overlaying lift.

3.5.1 Common Fill Placement

Provide for general site as indicated. Place in 6-inch loose lifts. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to a satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller, or both.

3.5.2 Select Fill Placement

Place in 8-inch loose lifts unless indicated otherwise. Compact area not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to a satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller, or both.

3.5.3 Trench Backfilling

Backfill as rapidly as construction, testing, and acceptance of work permits. Place and compact backfill under structures and paved areas in 6 inch loose lifts to top of trench and in 6 inch loose lifts to one foot over pipe and remainder in 12-inch loose lifts outside structures and paved areas.

3.5.3.1 Bedding Requirements

Bedding for buried piping in accordance with ASTM D 2487 classification SW. Plastic piping shall have bedding to spring line of pipe.

3.5.4 Coarse Aggregate Placement

Provide for depth interval where it is impractical to assure the water level is maintained as per paragraph entitled "Dewatering" subject to the approval of the Contracting Officer. Place in 1-foot loose lifts.

3.5.5 CR-6 and No. 67 Coarse Aggregates

Place in 1-foot loose lifts. Compact as indicated.

3.6 BURIED WARNING AND IDENTIFICATION TAPE

Provide buried utility lines with utility identification tape. Bury tape 9 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.7 BURIED DETECTION WIRE

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inches above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over its entire length. The wire shall enter manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, the wire shall terminate in the valve pit at the pump station end of the pipe.

3.8 SAMPLING

3.8.1 Sampling of Stored Material

Samples of stored material shall be collected at a frequency as required by the disposal facility. Analyses for contaminated material to be taken to an off-site treatment, storage, or disposal (TSD) facility shall conform to local, state, and federal criteria as well as to the requirements of the TSD facility. Documentation of all analyses performed shall be furnished to the Contracting Officer. Additional sampling and analyses to the extent required by the approved off-site TSD facility shall be the responsibility of the Contractor and shall be subject to approval by the Contracting Officer.

3.8.2 Sampling Liquid

Liquid collected from excavations, storage areas and decontamination facilities shall be sampled at a frequency as required by the TSD facility

if disposed off-site. On-site treatment shall be the preferred method if economics prove on-site treatment is more cost effective than off-site disposal. Analyses for contaminated liquid to be taken to an off-site TSD facility shall conform to local, state, and federal criteria as well as to the requirements of the TSD facility. Documentation of all analyses performed shall be furnished to the Contracting Officer. Additional sampling and analysis to the extent required by the approved off-site TSD facility receiving the material shall be the responsibility of the Contractor and shall be subject to approval by the Contracting Officer.

3.9 COMPACTION

Expressed as a percentage of maximum dry density. Determine in-place density of existing subgrade; if required density exists, no compaction of existing subgrade will be required.

3.9.1 General Site

Proof roll the existing subgrade within the limits of the engineered cap after clearing and grubbing activity is complete in accordance with paragraph entitled "Proof Rolling" if required.

3.9.2 Structures, Spread Footings, and Concrete Slabs

Compact top 12 inches of subgrades to 90 percent of ASTM D 1557. Compact fill and backfill material to 90 percent of ASTM D 1557. Compact aggregate to a minimum of 70 percent relative density in accordance with ASTM D 4253 and ASTM D 4254.

3.9.3 Landfill Material

Regraded and select landfill material shall be placed in eight inch loose lifts or as directed by the Contracting Officer as required to achieve acceptable compaction. Regraded and select landfill material shall be compacted in a systematic manner to ensure 200 percent coverage is provided over all areas, and at speeds between 2 1/2 and 3 1/2 miles per hour. Equipment used for compaction of regraded and select landfill material shall be a 40,000 pound (minimum) track-type tractor with a minimum ground contact pressure of 8.0 psi or equipment as appropriate for materials encountered. Regraded and select landfill material shall be compacted to provide a firm, stable, and unyielding base for the overlying geosynthetic components of the engineered cap subject to the approval of the Contracting Officer.

3.9.4 Common and Select Fill

Compact common fill to 90 percent of ASTM D 698 or minimum of 70 percent relative density in accordance with ASTM D 4253 and ASTM D 4254 unless otherwise indicated. Compact common fill used beneath geosynthetic components of engineered cap to a minimum of 95 percent of ASTM D 698.

Compact select fill to 90 percent of ASTM D 698 unless otherwise indicated.

Compact select fill used as vegetative support layer located above geosynthetic components of engineered cap to 85 percent of ASTM D 698.

3.9.5 Paved Areas

Compact common fill, trench, and backfill material to 90 percent of ASTM D 1557 or minimum of 70 percent relative density in accordance with ASTM D

4253 and ASTM D 4254 unless otherwise indicated.

3.9.6 Coarse Aggregates

Compact coarse aggregates to minimum of 70 percent relative density in accordance with ASTM D 4253 and ASTM D 4254 unless otherwise indicated.

3.10 FINISH OPERATIONS

3.10.1 Grading

Finish grades as indicated within one-quarter of one foot unless otherwise indicated or directed by the Contracting Officer. Grade areas to drain water away from structures. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed by the Contracting Officer.

3.10.2 Rip-Rap

MD SHA CM, Section 311.03.

3.10.3 Gabions

MD SHA CM, Section 313.03.

3.10.4 Protection of Surfaces

Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.11 DISPOSITION OF SURPLUS MATERIAL

Remove from Government property surplus or other soil material not required or suitable for filling or backfilling, and saleable timber.

3.12 FIELD QUALITY CONTROL

3.12.1 Sampling

Take the number and size of samples required to perform the following tests.

3.12.2 Testing

Perform one of each of the following tests for each material used. Provide additional tests for each source change.

3.12.2.1 Common Fill and Backfill Material Testing

Test common fill and backfill material in accordance with ASTM C 136 for conformance to ASTM D 2487 gradation limits; ASTM D 1140 for material finer than the No. 200 sieve; ASTM D 4318 for liquid and plastic limits; ASTM D 698, ASTM D 1557, ASTM D 4253, and ASTM D 4254 for moisture density relations, as applicable.

3.12.2.2 Select Fill Material Testing

Test select fill material in accordance with ASTM C 136 for conformance to ASTM D 2487 gradation limits; ASTM D 4318 for liquid and plastic limits; ASTM D 1140 for material finer than the No. 200 sieve; ASTM D 698 or ASTM D

1557 for moisture density relations, as applicable.

3.12.2.3 Coarse Aggregate Material Testing

Test in accordance with ASTM C 136 for conformance to MD SHA CM gradation limits; ASTM C 117 for material finer than the No. 200 sieve; and ASTM D 4253 and ASTM D 4254 for relative density.

3.12.2.4 Landfill Material Testing

Evaluation of degree of compaction for regraded and select landfill material shall be based on Contracting Officer's observations regarding compacted surfaces suitability as a bearing surface.

3.12.2.5 Density Tests

Test density in accordance with ASTM D 1556, or ASTM D 2922 and ASTM D 3017.

When ASTM D 2922 and ASTM D 3017 are used, verify density test results by performing an ASTM D 1556 density test at a location already ASTM D 2922 and ASTM D 3017 tested as specified herein. Perform an ASTM D 1556 density test at the start of the job, and for every 10 ASTM D 2922 and ASTM D 3017 tests thereafter. Test subgrade as appropriate; common fill, select fill, and coarse aggregate, each lift at randomly selected locations every 10,000 square feet and a minimum of 3 tests per lift per area; and backfill material and common fill in trenches a minimum 1 per lift at randomly selected locations.

-- End of Section --

TABLE 1
REFERENCE VALUES
PARAGRAPH "REQUIREMENTS FOR OFF-SITE SOIL"
SITE 42 - OLSEN ROAD LANDFILL
NDW-IH, INDIAN HEAD, MARYLAND
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Parameters	CAS #	CRQLs	USEPA Region III Residential Soil Risk-Based Criteria ⁽¹⁾	USEPA Region III Soil BTAG ⁽²⁾	USEPA Region III Sediment BTAG ⁽³⁾	Background Surface Soil ⁽⁴⁾
TAL Metals (mg/kg) [SW-846 6010B]						
ALUMINUM	7429-90-5	40	78,000	1	---	9,000
ANTIMONY	7440-36-0	12	31	0.48	150	---
ARSENIC	7440-38-2	3	0.43	328	8.2	5.2
BARIUM	7440-39-3	40	5,500	440	---	47.6
BERYLLIUM	7440-41-7	1	160	0.02	---	1.1
CADMIUM	7440-43-9	1	39	2.5	1.2	2.5
CALCIUM	7440-70-2	1,000	---	---	---	573
CHROMIUM	16065-83-1	2	230	0.0075	81	15.9
COBALT	7440-48-4	10	1,600	100	---	7.5
COPPER	7440-50-8	5	3100	15	34	8.0
CYANIDE	57-12-5	1	1,600	0.005	---	0.73
IRON	7439-89-6	20	23,000	12	---	16,000
LEAD (4)	7439-92-1	2	400	0.01	46.7	21.7
MAGNESIUM	7439-95-4	1,000	---	4,400	---	722
MANGANESE	7439-96-5	3	1,600	330	---	388
MERCURY	7439-97-6	0.1	23	0.058	0.15	0.060
NICKEL	7440-02-0	8	1600	2	20.9	6.6
POTASSIUM	7440-09-7	1,000	---	---	---	597
SELENIUM	7782-49-2	7	390	1.8	---	0.62
SILVER	7440-22-4	2	390	0.00001	1	0.84
SODIUM	7440-23-5	1,000	---	---	---	120
THALLIUM	7440-28-0	5	5.5	0.001	---	2.3
VANADIUM	7440-62-2	10	78	0.5	---	26.7
ZINC	7440-66-6	12	23,000	10	150	23.6
TCL Volatile Organics (ug/kg) [SW-846 8260B]						
1,1,1-TRICHLOROETHANE	71-55-6	---	22,000,000	300	31	---
1,1,2-TRICHLORO-1,2,2-TRIFLUORETHANE [1,1,2-TRICHLOROTRIFLUOROETHANE]	76-13-1	10	2,300,000,000	---	---	---
1,1,2,2-TETRACHLOROETHANE	79-34-5	10	3,200	---	---	---
1,1,2-TRICHLOROETHANE	79-00-5	10	11,000	300	31	---
1,1-DICHLOROETHANE	75-34-3	10	7,800,000	300	---	---
1,1-DICHLOROETHENE	75-35-4	10	3,900,000	---	---	---
1,2,4-TRICHLOROBENZENE	120-82-1	10	780,000	100	40	---
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	10	46	---	---	---
1,2-DIBROMOETHANE	106-93-4	10	7.5	5,000	---	---
1,2-DICHLOROBENZENE	95-50-01	10	7,000,000	100	35	---
1,2-DICHLOROETHANE	107-06-2	10	7,000	870,000	---	---
1,2-DICHLOROETHENE (TOTAL)	540-59-0	---	700,000	---	---	---
1,2-DICHLOROPROPANE	78-87-5	10	9,400	300	---	---
1,3-DICHLOROBENZENE	541-73-1	10	2,300,000	---	---	---
1,4-DICHLOROBENZENE	106-46-7	10	27,000	100	110	---
2-BUTANONE	78-93-3	10	47,000,000	---	---	---
2-HEXANONE	591-78-6	10	---	---	---	---
4-METHYL-2-PENTANONE	108-10-1	10	---	100,000	---	---
ACETONE	67-64-1	10	70,000,000	---	---	---
BENZENE	71-43-2	10	12,000	100	---	---
BROMODICHLOROMETHANE	75-27-4	10	10,000	450,000	---	---
BROMOFORM	75-25-2	10	81,000	1,147,000	---	---
BROMOMETHANE	74-83-9	10	110,000	---	---	---
CARBON DISULFIDE	75-15-0	10	7,800,000	---	---	---
CARBON TETRACHLORIDE	56-23-5	10	4,900	300	---	---
CHLOROBENZENE	108-90-7	10	1,600,000	100	---	---
CHLOROETHANE	75-00-3	10	220,000	---	---	---
CHLOROFORM	67-66-3	10	780,000	300	---	---
CHLOROMETHANE	74-87-3	10	---	---	---	---
CIS-1,2-DICHLOROETHENE	156-59-2	10	780,000	300	---	---
CIS-1,3-DICHLOROPROPENE	10061-01-5	10	6,400	300	---	---
CYCLOHEXANE	110-82-7	10	---	---	---	---
DIBROMOCHLOROMETHANE	124-48-1	10	7,600	---	---	---
DICHLORODIFLUOROMETHANE	75-71-8	10	16,000,000	---	---	---
ETHYLBENZENE	100-41-4	10	7,800,000	100	10	---
ISOPROPYLBENZENE	98-82-8	10	7,800,000	---	---	---

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METHYL ACETATE	79-20-9	10	78,000,000	---	---	---
METHYLCYCLOHEXANE	108-87-2	10	---	---	---	---
METHYLENE CHLORIDE	75-09-2	10	85,000	300	---	---
METHYL TERT-BUTYL ETHER	1634-04-4	10	160,000	---	---	---
STYRENE	100-42-5	10	16,000,000	100	---	---
TETRACHLOROETHENE	127-18-4	10	1,200	300	57	---
TOLUENE	108-88-3	10	1,600,000	100	---	---
TRANS-1,2-DICHLOROETHENE	156-60-5	10	1,600,000	300	---	---
TRANS-1,3-DICHLOROPROPENE	10061-02-6	10	6,400	300	---	---
TRICHLOROETHENE	79-01-6	10	1,600	300	---	---
TRICHLOROFLUOROMETHANE	75-69-4	10	23000000	---	---	---
VINYL CHLORIDE	75-01-4	10	90	300	---	---
XYLENES, TOTAL	1330-20-7	10	16,000,000	100	40	---
TCL Semivolatile Organics (ug/kg) [SW-846 8270C]						
1,2,4-TRICHLOROBENZENE	120-82-1	330	780,000	100	40	---
1,2-DICHLOROBENZENE	95-50-1	330	7,000,000	100	35	---
1,3-DICHLOROBENZENE	541-73-1	330	2,300,000	---	---	---
1,4-DICHLOROBENZENE	106-46-7	330	27,000	100	110	---
2,4,5-TRICHLOROPHENOL	95-95-4	830	7,800,000	100	---	---
2,4,6-TRICHLOROPHENOL	88-06-2	330	58,000	100	---	---
2,4-DICHLOROPHENOL	120-83-2	330	230,000	100	---	---
2,4-DIMETHYLPHENOL	105-67-9	330	1,600,000	100	29	---
2,4-DINITROPHENOL	51-28-5	830	160,000	100	---	---
2,4-DINITROTOLUENE	121-14-2	330	160,000	---	---	---
2,6-DINITROTOLUENE	606-20-2	330	78,000	---	---	---
2-CHLORONAPHTHALENE	91-58-7	330	6,300,000	---	---	---
2-CHLOROPHENOL	95-57-8	330	390,000	100	---	---
4,6-DINITRO-2-METHYLPHENOL	534-52-1	830	7,800	---	---	---
2-METHYLPHENOL	95-48-7	330	3,900,000	100	63	---
2-NITROANILINE	88-74-4	830	230,000	---	---	---
2-NITROPHENOL	88-75-5	330	---	---	---	---
4-METHYLPHENOL	106-44-5	330	390,000	100	670	---
3 & 4-METHYLPHENOL	M+P- CRESOLS		390,000	100	670	---
3,3'-DICHLOROBENZIDINE	91-94-1	330	1,400	---	---	---
3-NITROANILINE	99-09-2	830	23,000	---	---	---
2-METHYLNAPHTHALENE	91-57-6	---	310,000	---	70	---
4-BROMOPHENYL PHENYL ETHER	101-55-3	330	---	---	---	---
4-CHLORO-3-METHYL PHENOL	59-50-7	330	---	---	---	---
4-CHLOROANILINE	106-47-8	330	310,000	---	---	---
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	330	---	---	---	---
4-NITROANILINE	100-01-6	830	32,000	---	---	---
4-NITROPHENOL	100-02-7	830	---	100	---	---
BIS(2-CHLOROETHOXY)METHANE	111-91-1	330	---	---	---	---
BIS(2-CHLOROETHYL)ETHER	111-44-4	330	500	---	---	---
BIS(2-CHLOROISOPROPYL)ETHER [2,2'- OXYBIS(1-CHLOROPROPANE)]	108-60-1	330	9,100	---	---	---
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	330	46,000	---	1,300	---
BUTYLBENZYL PHTHALATE	85-68-7	330	16,000,000	---	63	---
CARBAZOLE	86-74-8	330	32,000	---	---	---
DIBENZOFURAN	132-64-9	330	160,000	---	540	---
DIETHYL PHTHALATE	84-66-2	330	63,000,000	---	200	---
DIMETHYL PHTHALATE	131-11-3	330	780,000,000	---	71	---
DI-N-BUTYL PHTHALATE	84-74-2	330	7,800,000	---	1,400	---
DI-N-OCTYL PHTHALATE	117-84-0	330	3,100,000	---	6,200	---
HEXACHLOROBENZENE	118-74-1	330	400	---	22	---
HEXACHLOROBUTADIENE	87-68-3	330	8,200	---	11	---
HEXACHLOROCYCLOPENTADIENE	77-47-4	330	470,000	---	---	---
HEXACHLOROETHANE	67-72-1	330	46,000	---	---	---
ISOPHORONE	78-59-1	330	670,000	---	---	---
NITROBENZENE	98-95-3	330	39,000	---	---	---
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	330	91	---	---	---
N-NITROSODIPHENYLAMINE	86-30-6	330	130,000	---	28	---

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PENTACHLOROPHENOL	87-86-5	830	5,300	100	360	---
PHENOL	108-95-2	330	23,000,000	100	420	---
ACENAPHTHENE	83-32-9	330	4,700,000	100	16	---
ACENAPHTHYLENE	208-96-8	330	4,700,000	100	44	---
ANTHRACENE	120-12-7	330	23,000,000	100	85.3	---
BENZO(A)ANTHRACENE	56-55-3	330	870	100	261	---
BENZO(A)PYRENE	50-32-8	330	87	100	430	---
BENZO(B)FLUORANTHENE	205-99-2	330	870	100	3,200	---
BENZO(G,H,I)PERYLENE	191-24-2	330	2,300,000	100	670	---
BENZO(K)FLUORANTHENE	207-08-9	330	8,700	100	---	---
CHRYSENE	218-01-9	330	87,000	100	384	---
DIBENZO(A,H)ANTHRACENE	53-70-3	330	87	100	63.4	---
FLUORANTHENE	206-44-0	330	3,100,000	100	600	---
FLUORENE	86-73-7	330	3,100,000	100	19	---
INDENO(1,2,3-CD)PYRENE	193-39-5	330	870	100	600	---
NAPHTHALENE	91-20-3	330	1,600,000	100	160	---
PHENANTHRENE	85-01-8	330	2,300,000	100	240	---
PYRENE	129-00-0	330	2,300,000	100	665	---
TCL Pesticides (ug/kg) [SW-846 8081A]						
4,4'-DDD	72-54-8	3.3	2,700	100	16	---
4,4'-DDE	72-55-9	3.3	1,900	100	2.2	---
4,4'-DDT	50-29-3	3.3	1,900	100	1.58	---
ALDRIN	309-00-2	1.7	38	100	---	---
ALPHA-BHC	319-84-6	1.7	100	100,000	---	---
ALPHA-CHLORDANE	5103-71-9	1.7	1,800	100	---	---
BETA-BHC	319-85-7	1.7	350	100	---	---
DELTA-BHC	319-86-8	1.7	100	---	---	---
DIELDRIN	60-57-1	3.3	40	100	---	---
ENDOSULFAN I	959-98-8	1.7	470,000	---	---	---
ENDOSULFAN II	33213-65-9	3.3	470,000	---	---	---
ENDOSULFAN SULFATE	1031-07-8	3.3	470,000	---	---	---
ENDRIN	72-20-8	3.3	23,000	100	---	---
ENDRIN ALDEHYDE	7421-93-4	3.3	23,000	---	---	---
ENDRIN KETONE	53494-70-5	3.3	23,000	---	---	---
GAMMA-BHC (LINDANE)	58-89-9	1.7	490	100	---	---
GAMMA-CHLORDANE	5103-74-2	1.7	1,800	100	---	---
HEPTACHLOR	76-44-8	1.7	140	---	---	---
HEPTACHLOR EPOXIDE	1024-57-3	1.7	70	100	---	---
METHOXYCHLOR	72-43-5	17	390,000	100	---	---
TOXAPHENE	8001-35-2	170	580	---	---	---
Polychlorinated Biphenyls (ug/kg) [SW-846 8082]						
AROCLOR-1016	12674-11-2	33	5,500	100	22.7	---
AROCLOR-1221	11104-28-2	67	320	100	22.7	---
AROCLOR-1232	11141-16-5	33	320	100	22.7	---
AROCLOR-1242	53469-21-9	33	320	100	22.7	---
AROCLOR-1248	12672-29-6	33	320	100	22.7	---
AROCLOR-1254	11097-69-1	33	320	100	22.7	---
AROCLOR-1260	11096-82-5	33	320	100	22.7	---
AROCLOR-1262	37324-23-5					
AROCLOR-1268	11100-14-4					
Miscellaneous (ug/kg)						
DIESEL RANGE ORGANICS		---	---	---	---	---
GASOLINE RANGE ORGANICS		---	---	---	---	---

1. United States Environmental Protection Agency (USEPA) Region III Risk-Based Concentration Table obtained from <http://www.epa.gov/reg3hwmd/risk/human/index.htm>

2. USEPA, 1995. Region III BTAG Screening Levels. Region III Biological Technical Assistance Group. Philadelphia, PA. January.

3. USEPA, 1995. Region III BTAG Screening Levels. Region III Biological Technical Assistance Group. Philadelphia, PA. January.

4. Values for 95% Upper Confidence Limit for surface soil from Table 4-2 of Background Soil Investigation Report for Indian Head and Stump Neck Annex, NSWC-IH (TINUS, October 2002).

SECTION 02372A

WASTE CONTAINMENT GEOMEMBRANE
10/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of the specification to the extent referenced. The publications are referenced in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 792	(2000) Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D 1004	(2003) Initial Tear Resistance of Plastic Film and Sheeting
ASTM D 1238	(2004) Melt Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D 1505	(2003) Density of Plastics by the Density-Gradient Technique
ASTM D 1603	(2001) Carbon Black in Olefin Plastics
ASTM D 2216	(1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 3776	(1996; R 2002) Mass Per Unit Area (Weight) of Fabric
ASTM D 3895	(2003) Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
ASTM D 4218	(1996; R 2001) Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique
ASTM D 4437	(1999) Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes
ASTM D 4632	(1991; R 2003) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4643	(2003) Determination of Water (Moisture) Content of Soil by the Microwave Oven Method
ASTM D 4833	(2000e1) Index Puncture Resistance of Geotextiles, Geomembranes, and Related

Products

ASTM D 5084	(2000e1) Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
ASTM D 5321	(2002) Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
ASTM D 5323	(1992; R 1999) Determination of 2% Secant Modulus for Polyethylene Geomembranes
ASTM D 5596	(2003) Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
ASTM D 5617	(1999e1) Multi-Axial Tension Test for Geosynthetics
ASTM D 5641	(1994; R 2001e1) Geomembrane Seam Evaluation by Vacuum Chamber
ASTM D 5721	(1995; R 2002) Air-Oven Aging of Polyolefin Geomembranes
ASTM D 5820	(1995; R 2001e1) Pressurized Air Channel Evaluation of Dual Seamed Geomembranes
ASTM D 5885	(1997) Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry
ASTM D 5887	(1999) Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter
ASTM D 5890	(2002) Swell Index of Clay Mineral Component of Geosynthetic Clay Liners
ASTM D 5891	(2002) Fluid Loss of Clay Component of Geosynthetic Clay Liners
ASTM D 5993	(1999) Measuring Mass Per Unit of Geosynthetic Clay Liners
ASTM D 5994	(1998; R 2003) Measuring Core Thickness of Textured Geomembrane
ASTM D 6392	(1999) Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
ASTM D 6693	(2003) Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

GEOSYNTHETIC INSTITUTE (GSI)

GSI GRI GM-11	(1997) Accelerated Weathering of Geomembrane Using a Fluorescent UVA Device
GSI GRI GM-12	(1998) Asperity Measurement of Textured Geomembranes Using a Depth Gauge

1.2 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0 of the basic contract.

SD-02 Shop Drawings

Layout and Detail Drawings

As-Built Drawings

Final as-built drawings of geomembrane installation.

SD-03 Product Data

Mechanical Anchoring Materials

Tests, Inspections, and Verifications

Manufacturer's and fabricator's QC manuals, a minimum of 14 days prior to geomembrane shipment.

Field Seaming

Installer's QC manual, a minimum of 14 days prior to geomembrane placement.

Qualifications

Manufacturer's, and fabricator's qualification statements, including resumes of key personnel involved in the project, a minimum of 14 days prior to geomembrane shipment.

Installer's, QC inspector's, and QC laboratory's qualification statements including resumes of key personnel involved in the project a minimum of 14 days prior to geomembrane placement. The submittal from the QC laboratory shall include verification that the laboratory is accredited via the Geosynthetic Accreditation Institute's Laboratory Accreditation Program (GAI-LAP) for the tests the QC laboratory will be required to perform.

SD-04 Samples

Samples; G

Geomembrane QA and QC samples.

SD-06 Test Reports

Geomembrane materials

GCL properties

Manufacturer's certified raw and sheet material test reports and a copy of the QC certificates, a minimum of 14 days prior to shipment of geomembrane and geosynthetic clay layer (GCL) to the site.

Surface Preparation

Certification from the QC inspector and installer of the acceptability of the surface on which the geomembrane or GCL is to be placed, immediately prior to geomembrane placement.

Non-Destructive Field Seam Continuity Testing

QC Inspector certified test results on all field seams.

Destructive Field Seam Testing

Installer and certified QC laboratory test results on all destructively tested field seams.

Destructive Seam Test Repairs

QC Inspector certified test results on all repaired seams.

Interface Friction Testing

Certified laboratory interface friction test results including description of equipment and test method, a minimum of 14 days prior to geomembrane shipment.

Tests

Multi-Axial Tensile Test

Certified QC test results.

1.3 QUALIFICATIONS

1.3.1 Manufacturer

Geomembrane and GCL manufacturers shall have produced the proposed sheets for at least 5 completed projects having a total minimum area of 10 million square feet.

1.3.2 Installer

The installer is responsible for field handling, deploying, seaming, anchoring, and field Quality Control (QC) testing of the geomembrane and GCL.

The installer shall have installed the proposed geomembrane material for at least 5 completed projects having a total minimum area of 2 million square feet. At least one seamer shall have experience seaming a minimum of 500,000 square feet of the proposed geomembrane using the same type of seaming equipment, polymer and geomembrane thickness specified for this project.

1.3.3 QC Inspector

The QC inspector is the person or corporation hired by the Contractor, who is responsible for monitoring and documenting activities related to the QC of the geomembrane and GCL from manufacturing through installation. The QC inspector shall have provided QC inspection during installation of the proposed geomembrane/GCL materials for at least 5 completed projects having a total minimum area of 2 million square feet.

1.3.4 QC Laboratory

The QC laboratory shall have provided QC and/or Quality Assurance (QA) testing of the proposed geomembrane and geomembrane seams for at least five completed projects having a total minimum area of 2 million square feet. The QC laboratory shall be accredited via the Geosynthetic Accreditation Institute's Laboratory Accreditation Program (GAI-LAP) for the tests the QC laboratory will be required to perform.

1.4 DELIVERY, STORAGE AND HANDLING

1.4.1 Delivery

The QC inspector shall be present during delivery and unloading of the geomembrane and GCL. Each geomembrane and GCL roll/panel shall be labeled with the manufacturer's name, product identification number, roll/panel number, and roll dimensions.

1.4.2 Geomembrane Storage

Temporary storage at the project site shall be on a level surface, free of sharp objects where water cannot accumulate. The geomembrane shall be protected from puncture, abrasion, excessive heat or cold, material degradation, or other damaging circumstances. Storage shall not result in crushing the core of roll goods or flattening of the rolls. Rolls shall not be stored more than two high. Palletted materials shall be stored on level surfaces and shall not be stacked on top of one another. Damaged geomembrane shall be removed from the site and replaced with geomembrane that meets the specified requirements.

1.4.3 GCL Storage

Field storage shall be in flat dry areas where water cannot accumulate and the GCL rolls can be protected from damage. Storage of the GCL rolls on blocks or pallets will not be allowed unless the GCL rolls are fully supported. Stacks of GCL rolls shall be no greater than three high. Rolls shall be covered with a water proof tarpaulin or plastic sheet if stored outdoors.

1.4.4 Handling

Rolls/panels shall not be dragged, lifted by one end, or dropped. A pipe or solid bar, of sufficient strength to support the full weight of a roll without bending, shall be used for all handling activities. The diameter of the pipe or solid bar shall be small enough to be easily inserted through the core of the roll. Chains shall be used to link the ends of the pipe or bar to the ends of a spreader bar. The spreader bar shall be wide enough to prevent the chains from rubbing against the ends of the roll. Alternatively, a stinger bar protruding from the end of a forklift or other equipment may be used. The stinger bar shall be at least three-fourths the

length of the core and also must be capable of supporting the full weight of the roll without bending. If recommended by the manufacturer, a sling handling method utilizing appropriate loading straps may be used.

1.5 WEATHER LIMITATIONS

Geomembrane shall not be deployed or field-seamed in the presence of excess moisture (i.e., rain, fog, dew), in areas of ponded water, or in the presence of excess wind. No placement or seaming shall be attempted at ambient temperatures below 32 degrees F or above 104 degrees F. Ambient temperature shall be measured at a height no greater than 6 inches above the ground or geomembrane surface. In marginal conditions, seaming shall cease unless destructive field seam tests, conducted by the QC laboratory, confirm that seam properties meet the requirements listed in Table 2. Tests shall be conducted in accordance with paragraph entitled "Destructive Field Seam Testing."

1.6 EQUIPMENT

Equipment used in performance of the work shall be in accordance with the geomembrane manufacturer's recommendations and shall be maintained in satisfactory working condition.

PART 2 PRODUCTS

2.1 GEOMEMBRANE MATERIALS

2.1.1 Raw Materials

Resin used in manufacturing geomembrane sheets shall be made of virgin uncontaminated ingredients with a density of 0.915 to 0.925 g/ml measured in accordance with ASTM D 1505 or ASTM D 792 Method B, and a melt index value of less than 1.0 g/10 minutes measured in accordance with ASTM D 1238. No more than 10 percent regrind, reworked, or trim material in the form of chips or edge strips shall be used to manufacture the geomembrane sheets. All regrind, reworked, or trim materials shall be from the same manufacturer and exactly the same formulation as the geomembrane sheet being produced. No post consumer materials or water-soluble ingredients shall be used to produce the geomembrane. For geomembranes with plasticizers, only primary plasticizers that are resistant to migration shall be used. The Contractor shall submit a copy of the test reports and QC certificates for raw materials used in the manufacturing of the geomembrane shipped to the site.

2.1.2 Sheet Materials

Geomembrane sheets shall be unreinforced and manufactured as wide as possible to minimize factory and field seams. Geomembrane sheet minimum width shall be 15-feet. Geomembrane sheets shall be uniform in color, thickness, and be textured on both faces. The textured surface features shall consist of raw materials identical to that of the parent sheet material and shall be uniform over the entire face of the geomembrane. The sheets shall be free of and resistant to fungal or bacterial attack and free of cuts, abrasions, holes, blisters, contaminants and other imperfections. Geomembrane sheets and factory seams shall conform to the requirements listed in Table 1 for Manufacturing Quality Control (MQC).

TABLE 1. TEXTURED LLDPE GEOMEMBRANE PROPERTIES

PROPERTY	TEST VALUE ⁽¹⁾	MQC TESTING FREQUENCY (MIN.) ⁽²⁾	TEST METHOD
Nominal Thickness	40 mils		
Thickness (min ave)	38.0	per roll	ASTM D 5994
Lowest individual for 8 out of 10 values	36.0	per roll	ASTM D 5994
Lowest individual of 10 values	34.0	per roll	ASTM D 5994
Asperity Height (min ave) (3)	10 mils	every second roll	GSI GRI GM-12 (4)
Density (max)	0.939 g/cc	per 200,000 lb	ASTM D 1505 or ASTM D 792 Method B
Tensile Properties (min ave) (5)		per 20,000 lb	ASTM D 6693 Type IV
-break stress	60 lb/in		
-break elong	250 percent		
2% Secant Modulus (max)	2,400 lb/in	per formulation	ASTM D 5323
Tear Resistance (min ave)	22 lb	per 45,000 lb	ASTM D 1004
Puncture Resistance (min ave) (3)	44 lb	per 45,000 lb	ASTM D 4833
Axi-Symmetric Break Resistance Strain (min)	30 percent	per formulation or per 150,000 sq ft whichever is greater	ASTM D 5617
Carbon Black Content	2.0-3.0 percent	per 20,000 lb	ASTM D 1603 (6)
Carbon Black Dispersion	(7)	per 45,000 lb	ASTM D 5596
Oxidative Induction Time (OIT) (min ave) (8)		per 200,000 lb	

TABLE 1. TEXTURED LLDPE GEOMEMBRANE PROPERTIES

PROPERTY	TEST VALUE ⁽¹⁾	MQC TESTING FREQUENCY (MIN.) ⁽²⁾	TEST METHOD
-Std OIT or -High Pres OIT	100 min 400 min		ASTM D 3895 ASTM D 5885
Oven Aging at 85 deg C (min ave) (8) (9)		per year and change in formulation	ASTM D 5721
-Std OIT or -High Pres OIT	35 percent at 90 days 60 percent at 90 days		ASTM D 3895 ASTM D 5885
UV Resistance (min ave) (10) (11)		per year and change in formulation	GS1 GRI GM-11
-High Pres OIT (12)	35 percent at 1600 hours		ASTM D 5885

NOTES:

(1) Test values listed shall be interpreted according to the designated test method.

(2) Test properties at minimum frequencies indicated or in accordance with the approved MQC manual whichever is more stringent.

(3) Textured Geomembrane Only: Of 10 readings; 8 out of 10 must be greater than or equal to 7 mil, and lowest individual reading must be greater than or equal to 5 mil.

(4) Textured Geomembrane Only: Alternate the measurement side for double sided textured sheet.

(5) Minimum average machine direction and minimum average cross machine direction values shall be based on 5 test specimens in each direction. For LLDPE geomembrane, break elongation is calculated using a gage length of 2.0 inches at 2.0 inches/min.

(6) Other methods such as ASTM D 4218 or microwave methods are acceptable if an appropriate correlation to ASTM D 1603 can be established.

(7) Carbon black dispersion for 10 different views:
- minimum 9 of 10 in Categories 1 or 2
- all 10 in Categories 1, 2, or 3

(8) The manufacturer has the option to select either one of the OIT methods to evaluate the antioxidant content.

- (9) Evaluate samples at 30 and 60 days and compare with the 90 day response.
- (10) The condition of the test shall be a 20 hour UV cycle at 167 degrees F followed by a 4 hour condensation cycle at 140 degrees F.
- (11) The standard OIT test (ASTM D 3895) shall not be used in determining UV resistance.
- (12) UV resistance is based on percent retained value regardless of the original high pressure OIT value.

TABLE 2. TEXTURED LLDPE SEAM PROPERTIES

PROPERTY	TEST VALUE ⁽¹⁾	TEST METHOD
Seam Shear Strength (min) (2)	60 lb/in	ASTM D 6392
Seam Peel Strength (min) (2) (3)	50 lb/in	ASTM D 6392

NOTES:

- (1) Test values listed shall be interpreted according to the designated test method.
- (2) Seam tests for peel and shear must fail in the Film Tear Bond mode. This is a failure in the ductile mode of one of the bonded sheets by tearing or breaking prior to complete separation of the bonded area.
- (3) Where applicable, both tracks of a double hot wedge seam shall be tested for peel adhesion.

2.2 GCL PROPERTIES

GCL shall be a manufactured product consisting of a sodium montmorillonite clay (bentonite) layer evenly distributed between an upper non-woven geotextile and a lower woven geotextile. GCL shall conform to the property requirements listed in Table 3. Where applicable, Table 3 property values represent minimum average roll values (MARV) in the weakest principle direction. GCL shall be free of tears, holes, or other defects which may affect its serviceability. Encapsulating geotextiles shall be mechanically bonded together using a needle punch or stitch bonding process. Needle punched and stitch bonded GCLs shall be continuously inspected for broken needles using an in-line metal detector and broken needles shall be removed.

TABLE 3 - GCL PROPERTIES

PROPERTY	TEST VALUE ⁽¹⁾	FREQUENCY	TEST METHOD
BENTONITE			
Swell Index, minimum	24 mL	--	ASTM D 5890

TABLE 3 - GCL PROPERTIES

PROPERTY	TEST VALUE ⁽¹⁾	FREQUENCY	TEST METHOD
Fluid Loss, maximum	18 mL	--	ASTM D 5891
GEOTEXTILE			
Weight	3.0 oz/sy	--	ASTM D 3776
Grab Strength	>85 lbs	--	ASTM D 4632
Grab Elongation	<60 percent	--	ASTM D 4632
COMPOSITE			
Bentonite Mass/Unit Area, (2) (3)	0.75 lb/sf	1/40,000 sf	ASTM D 5993
Overlap Seam Permeability under 5 psi effective confining pressure	$<5 \times 10^{-9}$ cm/s	1/1,000,000 sf	ASTM D 5084
Index Flux, maximum	1×10^{-8} m/m ² /sec	--	ASTM D 5887
Peel Strength	15 lbs	--	ASTM D 4632

NOTES:

(1) Test values listed shall be interpreted according to the designated test method.

(2) MARV = minimum average roll value.

(3) Bentonite mass/unit area shall be computed at 10 percent moisture content. Moisture content shall be determined by ASTM D 2216 or ASTM D 4643. Bentonite mass/unit area is exclusive of glues added to the bentonite.

Submit manufacturer's certified raw and roll material data sheets. If needle punching or stitch bonding is used in construction of GCL, the certification shall indicate that the GCL has been continuously inspected for broken needles using an in-line metal detector and all broken needles have been removed. The certified data sheets shall be attested to by a person having legal authority to bind the GCL manufacturing company.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

2.3.1 Interface Friction Testing

Laboratory interface friction tests shall be conducted on the following interfaces: common fill vs. textured geomembrane, select fill vs. geocomposite drainage layer, and textured geomembrane vs. geocomposite drainage layer. The frequency of testing for each interface shall be 1 per project. Geomembrane material for interface friction testing shall be

obtained from the geomembrane to be shipped to the site (i.e., manufacturer's lot and run designated for use on this project). Tests shall be conducted in accordance with ASTM D 5321. Normal stresses of 1.0, 1.5, and 3.0 psi along with a displacement rate of 0.04 inches per minute shall be used. Interfaces tested shall be saturated for a minimum of 24 hours prior to testing. Soil components shall be the same as used for full scale construction and shall be compacted to the same moisture-density requirements specified for full scale field placement. Geosynthetics shall be the same as used for full scale construction. Geosynthetics shall be oriented such that the shear force is parallel to the down slope orientation of these components in the field. A minimum peak interface friction angle of 23.4 degrees is required for all interfaces. Textured geomembrane vs. geocomposite drainage layer shall have minimum apparent zero normal load adhesion of 50 psi. Geomembrane material subjected to interface friction testing shall be tested for asperity height in accordance with GSI GRI GM-12. A portion of that geomembrane material test sample shall be provided to the Contracting Officer for approval.

2.3.2 Manufacturing, Sampling, and Testing

2.3.2.1 Raw Materials

Raw materials shall be tested in accordance with the approved MQC manual. Any raw material which fails to meet the geomembrane manufacturer's specified physical properties shall not be used in manufacturing the sheet. Seaming rods and pellets shall be manufactured of materials which are essentially identical to that used in the geomembrane sheet. Seaming rods and pellets shall be tested for density, melt index and carbon black content in accordance with the approved MQC manual. Seaming rods and pellets which fail to meet the corresponding property values required for the sheet material, shall not be used for seaming.

2.3.2.2 Sheet Material

Geomembrane sheets shall be tested in accordance with the approved MQC manual. As a minimum, MQC testing shall be conducted at the frequencies shown in Table 1. Sheets not meeting the minimum requirements specified in Table 1 shall not be sent to the site.

2.3.2.3 Multi-Axial Tensile Test

Conduct at the frequencies shown on Table 1. Testing shall be conducted by the laboratory and certification shall be provided by the laboratory of test results prior to installation.

2.4 MECHANICAL ANCHORING MATERIALS

As indicated. Provide information if alternative materials are proposed.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Layout and Detail Drawings

Geomembrane panel layout and penetration detail drawings, a minimum of 14 days prior to geomembrane placement.

3.1.2 Surface Preparation

Surface preparation shall be performed in accordance with Section 02315N, "Excavation and Fill." Rocks larger than 1/2 inch in diameter and any other material which could damage the geomembrane shall be removed from the surface to be covered with the geomembrane. Construction equipment tire or track deformations beneath the geomembrane shall not be greater than 1.0 inch in depth. Each day during placement of geomembrane, the QC Inspector and installer shall inspect the surface on which geomembrane is to be placed and certify in writing that the surface is acceptable. Repairs to the subgrade shall be performed at no additional cost to the Government.

3.1.3 Anchor Trenches

As indicated or required. The anchor trench shall be 12 inches deep and 12 inches wide. If the anchor trench is excavated in cohesive soil susceptible to desiccation, only the amount of anchor trench required for placement of geomembrane in a single day shall be excavated. Ponded water shall be removed from the anchor trench while the trench is open. Trench corners shall be slightly rounded to avoid sharp bends in the geomembrane. Loose soil, rocks larger than 1/2 inch in diameter, and any other material which could damage the geomembrane shall be removed from the surfaces of the trench. The geomembrane shall extend down the front wall and across the bottom of the anchor trench. Backfilling and compaction of the anchor trench shall be in accordance with Section 02315N, "Excavation and Fill."

3.1.4 GCL Placement

GCL shall be installed as indicated. GCL shall be installed as soon as practical after completion and approval of the subgrade; but, GCL shall not be deployed if it is frozen. Rolls shall be delivered to the work area in their original packaging. Immediately prior to deployment, the packaging shall be carefully removed without damaging the GCL. GCL which has been hydrated prior to being covered by an overlying geomembrane shall be removed and replaced. Hydrated GCL is defined as material which has become soft as determined by squeezing the material with finger pressure or material which has exhibited swelling. Dragging of GCL panels over the ground surface shall be minimized. Deployed GCL panels shall lie flat on the subgrade surface, with no wrinkles or folds.

3.1.5 GCL Seams

On side-slopes, GCL shall be placed with seams oriented parallel to the line of maximum slope and shall be free of tension or stress upon completion of the installation. Panels shall be positioned with the overlap recommended by the manufacturer, but not less than 6 inches after shrinkage for panel sides or 18 inches after shrinkage for panel ends. Dirt or other foreign matter shall be removed from the overlap area immediately prior to seaming. If recommended by the manufacturer, granular bentonite of the same type as the bentonite used for the GCL shall be placed along the entire overlap width at a minimum rate of 0.25 lbs/linear foot or as recommended by the manufacturer. Construction adhesive or other approved seaming methods recommended by the manufacturer shall be used for horizontal seams on slopes. Overlaps which occur on slopes shall be constructed with the up slope GCL shingled over the down slope GCL. Alternate seaming methods may be approved if recommended by the manufacturer.

3.2 CONTRACTOR'S RESTRICTIONS

No equipment or tools shall be used that damage the geosynthetic materials by handling, trafficking or other means. No personnel working on the geomembrane shall smoke, wear damaging footwear or engage in other activities that can damage the geosynthetic materials. The method used to unroll the panels shall not disturb pipes, backfill or underlying geosynthetics.

The storage of fuel oils and other petroleum products shall be restricted to off-capping areas and shall not be located adjacent to or immediately up-gradient to select waste or geosynthetic covered areas. Equipment maintenance (fueling, replacing oil & filters, etc.) shall not take place on select waste or geosynthetic covered areas. Any leakage of petroleum products shall be immediately removed from the select waste or geosynthetic covered areas.

The QC Inspector shall visually observe each panel, after placement and prior to seaming for damage. The QC Inspector shall determine which panels or portions of panels shall be rejected, repaired or accepted. Damaged panels or portions of panels which have been rejected shall be marked and their removal or repair recorded by the QC Inspector.

3.3 GEOMEMBRANE DEPLOYMENT

The procedures and equipment used shall not elongate, wrinkle, scratch, or otherwise damage the geomembrane, other geosynthetic layers, or the underlying subgrade. Textured geomembrane shall not be dragged across the GCL. Geomembrane damaged during installation shall be replaced or repaired, at the QC Inspector's discretion. Only geomembrane panels that can be anchored and seamed together the same day shall be deployed. Adequate ballast (i.e., sand bags) shall be placed on the geomembrane, without damaging the geomembrane, to prevent uplift by wind. No equipment shall be operated on the top surface of the geomembrane without permission from the Contracting Officer. If approved, small rubber tired equipment, with a maximum tire inflation pressure of 5 pounds per square inch, may be used directly on the geomembrane. The small rubber tired equipment shall not operate on slopes steeper than 5 horizontal to 1 vertical and the tires shall be inspected for rocks lodged in the treads prior to and during use on top of geomembrane. No abrupt stops or turns by equipment shall be allowed on the geomembrane. Seams shall be oriented parallel to the line of maximum slope. Where seams can only be oriented across the slope, the upper panel shall be lapped over the lower panel.

3.3.1 Wrinkles

The methods used to deploy and backfill over the geomembrane shall minimize wrinkles and tensile stresses in the geomembrane. The geomembrane shall have adequate slack to prevent the creation of tensile stress. The wrinkle height to width ratio for installed geomembrane shall not exceed 0.5. In addition, geomembrane wrinkles shall not exceed 6 inches in height. Wrinkles that do not meet the above criteria shall be cut out and repaired in accordance with the installer's approved QC manual.

3.4 FIELD SEAMING

3.4.1 Trial Seams

Trial seams shall be made under field conditions on strips of excess

geomembrane. Trial seams shall be made each day prior to production seaming, whenever there is a change in seaming personnel, seaming equipment, when seaming equipment is turn off or unplugged, and at least once every four hours, by each seamer and each piece of seaming equipment used that day. Trial seam samples shall be collected and tested in accordance with ASTM D 6392. One sample shall be obtained from each trial seam. This sample shall be at least 36 inches long by 12 inches wide with the seam centered lengthwise. Ten random specimens 1 inch wide shall be cut from the sample. Five seam specimens shall be field tested for shear strength and 5 seam specimens shall be field tested for peel adhesion using an approved quantitative tensiometer in accordance with ASTM D 4437. To be acceptable, 4 out of 5 replicate test specimens shall meet seam shear and peel strength requirements specified in Table 2 and the fifth replicate specimen shall meet or exceed 80 percent of the shear and peel strength requirements specified in Table 2. If the field tests fail to meet these requirements, the entire operation shall be repeated. If the additional trial seam fails, the seaming apparatus or seamer shall not be used until the deficiencies are corrected by the installer and 2 consecutive successful trial seams are achieved.

3.4.2 Field Seams

Panels shall be seamed in accordance with the geomembrane manufacturer's recommendations. In corners and odd-shaped geometric locations, the number of field seams shall be minimized. Seaming shall extend to the outside edge of panels. Wet surfaces shall be thoroughly dried and soft subgrades shall be compacted and approved prior to seaming. The seam area shall be free of moisture, dust, dirt, and foreign material at the time of seaming. Fish mouths in seams shall be repaired. The following information shall be recorded for each seam:

- a. Panel Number
- b. Seam number
- c. Date and time seam was constructed
- d. Temperature of geomembrane at time of seaming
- e. Seaming unit designation
- f. Name of seamer
- g. Seaming equipment temperature and pressures

3.4.2.1 Polyethylene Seams

Polyethylene geomembranes shall be seamed by thermal fusion methods. Extrusion welding shall only be used for patching and seaming in locations where thermal fusion methods are not feasible. Seam overlaps that are to be attached using extrusion welds shall be ground prior to welding. Grinding marks shall be oriented perpendicular to the seam direction and no marks shall extend beyond the extrudate after placement. Extrusion welding shall begin within 10 minutes after grinding. Where extrusion welds are temporarily terminated long enough to cool, they shall be ground prior to applying new extrudate over the existing seam. The total depth of the grinding marks shall be no greater than 10 percent of the sheet thickness.

3.5 SAMPLES

One QC sample, 18 inches in length, for the entire width of a roll, shall be obtained for every 50,000 square feet of material delivered to the site.

Samples shall not be obtained from the first three feet of the roll. The samples shall be identified by manufacturer's name, product identification, lot and roll/panel number. The date, a unique sample number, and the machine direction shall also be noted. In addition, a 12 inch by 12 inch QA sample shall be collected, labeled, and submitted to the Contracting Officer each time QC samples are collected.

3.6 TESTS

The Contractor shall provide all QC samples to the QC laboratory to determine density, thickness, tensile strength at break, and elongation at break in accordance with the methods specified in Table 1. Samples not meeting the specified requirements shall result in the rejection of applicable rolls/panels. As a minimum, rolls/panels produced immediately prior to and immediately after the failed roll/panel shall be tested for the same failed parameter. Testing shall continue until a minimum of three successive rolls/panels on both sides of the original failing roll/panel pass the failed parameter.

3.6.1 Non-Destructive Field Seam Continuity Testing

Field seams shall be non-destructively tested for continuity over their full length in accordance with the installer's approved QC manual. At a minimum, field seams created using a dual hot wedge fusion welder shall be tested by air channel pressure testing in accordance with ASTM D 5820. Seam testing shall be performed as the seaming work progresses, not at the completion of field seaming. Any seams which fail shall be documented and repaired in accordance with the installer's approved QC manual. QC Inspector certified test results on all field seams.

3.6.2 Destructive Field Seam Testing

A minimum of one destructive test sample per 750 feet of field seam shall be obtained at locations specified by the QC Inspector. Sample locations shall not be identified prior to seaming. Samples shall be a minimum of 12 inches wide by 42 inches long with the seam centered lengthwise. Each sample shall be cut into 3 equal pieces, with one piece retained by the installer, one piece given to the QC laboratory, and the remaining piece given to the RIOCC NTR for QA testing and/or permanent record. Each sample shall be numbered and cross referenced to a field log which identifies: (1) panel number; (2) seam number; (3) date and time cut; (4) ambient temperature within 6 inches above the geomembrane; (5) seaming unit designation; (6) name of seamer; and (7) seaming apparatus temperature and pressures (where applicable). Ten 1 inch wide replicate specimens shall be cut from the installer's sample. Five specimens shall be tested for shear strength and 5 for peel adhesion using an approved field quantitative tensiometer in accordance with ASTM D 4437. Jaw separation speed shall be in accordance with the approved QC manual. To be acceptable, 4 out of 5 replicate test specimens shall meet the seam strength requirements specified in Table 2 and the fifth replicate specimen shall meet or exceed 80 percent of the shear and peel strength requirements specified in Table 2.

If the field tests pass, 5 specimens shall be tested at the QC laboratory for shear strength and 5 for peel adhesion in accordance with the QC laboratory's approved procedures. To be acceptable, 4 out of 5 replicate test specimens shall meet the seam strength requirements specified in Table

2 and the fifth replicate specimen shall meet or exceed 80 percent of the shear and peel strength requirements specified in Table 2. If the field or laboratory tests fail, the seam shall be repaired in accordance with paragraph entitled "Destructive Seam Test Repairs." Holes for destructive seam samples shall be repaired the same day they are cut.

3.7 DEFECTS AND REPAIRS

3.7.1 Destructive Seam Test Repairs

Seams that fail destructive seam testing may be overlaid with a strip of new material and seamed (cap stripped). Alternatively, the seaming path shall be retraced to an intermediate location a minimum of 10 feet on each side of the failed seam location. At each location a 12 by 18 inch minimum size seam sample shall be taken for 2 additional shear strength and 2 additional peel adhesion tests using an approved quantitative field tensiometer. If these tests pass, then the remaining seam sample portion shall be sent to the QC laboratory for 5 shear strength and 5 peel adhesion tests in accordance with the QC laboratory's approved procedures. To be acceptable, 4 out of 5 replicate test specimens must meet specified seam strength requirements. If these laboratory tests pass, then the seam shall be cap stripped or repaired using other approved methods between that location and the original failed location. If field or laboratory tests fail, the process shall be repeated. QC Inspector certified test results on all repaired seams. After repairs are completed, the repaired seam shall be non-destructively tested in accordance with paragraph entitled "Non-Destructive Field Seam Continuity Testing."

3.7.2 Patches

Tears, holes, blisters and other defects shall be repaired with patches. Patches shall have rounded corners, be made of the same geomembrane, and extend a minimum of 6 inches beyond the edge of defects. Minor localized flaws shall be repaired by spot welding or seaming as determined by the QC Inspector. Repairs shall be non-destructively tested in accordance with ASTM D 5641. The Contracting Officer or the QC Inspector may also elect to perform destructive seam tests on suspect areas.

3.8 VISUAL INSPECTION AND EVALUATION

Immediately prior to covering, the geomembrane, seams, and non-seam areas shall be visually inspected by the QC Inspector and Contracting Officer for defects, holes, or damage due to weather conditions or construction activities. At the Contracting Officer's or the QC Inspector's discretion, the surface of the geomembrane shall be brushed, blown, or washed by the installer if the amount of dust, mud, or foreign material inhibits inspection or functioning of the overlying material. Each suspect location shall be non-destructively tested in accordance with paragraph entitled "Non-Destructive Field Seam Continuity Testing." Each location that fails non-destructive testing shall be repaired in accordance with paragraph entitled "Patches" and non-destructively retested.

3.9 PENETRATIONS

Geomembrane penetration details shall be as shown on the drawings. Factory fabricated boots shall be used wherever possible. Field seams for penetrations shall be non-destructively tested in accordance with the installer's approved QC manual. Seams that fail non-destructive testing shall be repaired in accordance with the installer's approved QC manual and

non-destructively tested prior to acceptance.

3.10 GEOMEMBRANE MECHANICAL ANCHORING

As indicated.

3.11 PROTECTION AND BACKFILLING

The deployed and seamed geomembrane shall be covered with the geocomposite drainage layer within 5 calendar days of acceptance. Wrinkles in the geomembrane shall be prevented from folding over during placement of cover materials. Cover soil shall not be dropped onto the geomembrane or overlying geosynthetics from a height greater than 3 feet. The soil shall be pushed out over the geomembrane or overlying geosynthetics in an upward tumbling motion. Soil shall be placed from the bottom of the slope upward.

The initial loose soil lift thickness shall result in a minimum initial lift compacted thickness of 12 inches. Equipment with ground pressures less than 5.0 psi shall be used to place the initial lift and subsequent lifts over the geomembrane until a minimum 18 inches of compacted thickness above the geomembrane is achieved. Equipment with ground pressure less than 7.0 psi shall be used to place the remaining lifts over the geomembrane after a minimum 18 inches of compacted thickness above the geomembrane is achieved. The initial 12-inch lift of soil placed above the geomembrane shall be compacted in a systematic manner to ensure 200 percent coverage is provided. Compact areas not accessible to large scale construction equipment and materials including aggregates with mechanical hand tampers in a systematic manner to ensure 200 percent coverage is provided. Initial 12-inch lift density and density testing requirements may be waived by the Contracting Officer provided the lift or area provides a stable and firm surface. A minimum of 18 inches of compacted cover shall be maintained between full-scale construction equipment and geosynthetic materials during the covering process within areas receiving bituminous concrete pavement. Cover soil compaction and testing requirements are described in Section 02315N, "Excavation and Fill." Equipment placing cover soil shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph.

3.12 AS-BUILT DRAWINGS

Final as-built drawings of the geomembrane installation shall be prepared. These drawings shall include panel numbers, seam numbers, location of repairs, destructive seam samples, and penetrations.

-- End of Section --

SECTION 02373

GEOTEXTILE
09/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of the specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 3786	(2001) Hydraulic Bursting Strength of Textile Fabrics - Diaphragm Bursting Strength Tester Method
ASTM D 4354	(1999) Sampling of Geosynthetics for Testing
ASTM D 4355	(2002) Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus
ASTM D 4491	(1999a) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 2003) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4759	(2002) Determining the Specification Conformance of Geosynthetics
ASTM D 4833	(2000e1) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D 5261	(1992; R 2003) Measuring Mass per Unit Area of Geotextiles

GEOSYNTHETIC INSTITUTE (GSI)

GSI GRI GT-12a	(2002) Test Methods and Properties for Nonwoven Geotextiles Used as Protection (or Cushioning) Materials
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MARYLAND STATE HIGHWAY ADMINISTRATION (MD SHA)

MD SHA CM

(2001) Standard Specifications for
Construction and Materials

1.2 SUBMITTALS

The following shall be submitted in accordance with Section C, Part 7.0 of the basic contract.

SD-03 Product Data

Thread

A minimum of 14 days prior to scheduled use, proposed thread type for sewn seams along with data sheets showing the physical properties of the thread.

Manufacturing Quality Control Manual

A minimum of 14 days prior to scheduled use, manufacturer's quality control manual.

SD-04 Samples

Quality Assurance Samples and Tests

Samples for quality assurance testing; 14 days shall be allotted in the schedule to allow for testing.

SD-07 Certificates

Geotextile

A minimum of 14 days prior to scheduled use, manufacturer's certificate of compliance stating that the geotextile meets the requirements of this section. The submittal shall include copies of manufacturer's quality control test results. For needle punched geotextiles, the manufacturer shall also certify that the geotextile has been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers. The certificate of compliance shall be attested to by a person having legal authority to bind the geotextile manufacturer.

Independent Laboratory Qualifications

1.3 INDEPENDENT LABORATORY QUALIFICATIONS

The independent construction quality control (QC) laboratory shall have provided QC and/or quality assurance (QA) testing of geotextiles for at least five completed projects having a total minimum area of 2 million square feet. The QC laboratory shall carry current accreditation via the Geosynthetic Accreditation Institute's Laboratory Accreditation Program (GAI-LAP) for the tests the QC laboratory will be required to perform.

1.4 DELIVERY, STORAGE AND HANDLING

Delivery, storage, and handling of geotextile shall be in accordance with

ASTM D 4873.

1.4.1 Delivery

The Contracting Officer shall be notified a minimum of 24 hours prior to delivery and unloading of geotextile rolls. Rolls shall be packaged in an opaque, waterproof, protective plastic wrapping. The plastic wrapping shall not be removed until deployment. If quality assurance samples are collected, rolls shall be immediately rewrapped with the plastic wrapping. Geotextile or plastic wrapping damaged during storage or handling shall be repaired or replaced, as directed. Each roll shall be labeled with the manufacturer's name, geotextile type, roll number, roll dimensions (length, width, gross weight), and date manufactured.

1.4.2 Storage

Rolls of geotextile shall be protected from ultraviolet radiation, construction equipment, chemicals, sparks and flames, temperatures in excess of 160 degrees F, or any other environmental condition that may damage the physical properties of the geotextile. To protect geotextile from becoming saturated, rolls shall either be elevated off the ground or placed on a sacrificial sheet of plastic in an area where water will not accumulate.

1.4.3 Handling

Geotextile rolls shall be handled and unloaded with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Rolls shall not be dragged along the ground, lifted by one end, or dropped to the ground.

PART 2 PRODUCTS

2.1 RAW MATERIALS

2.1.1 Geotextile

Geotextile shall be a nonwoven needle-punched pervious sheet of polymeric material and shall consist of long-chain synthetic polymers composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. The use of woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) and heat calendered non-woven geotextiles will not be allowed. Stabilizers and/or inhibitors shall be added to the base polymer, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Regrind material, which consists of edge trimmings and other scraps that have never reached the consumer, may be used to produce the geotextile. Post-consumer recycled material may also be used. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Geotextiles shall meet the requirements specified in Tables 1, 2, and 3. Where applicable, Tables 1, 2 and 3 property values represent minimum average roll values (MARV) in the weakest principal direction. Value for AOS represents the minimum value and corresponding 95 percent opening size (O_{95}) represents the maximum value.

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR SEPARATION GEOTEXTILE

PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
GRAB STRENGTH	LBS	160	ASTM D 4632
ELONGATION BREAK	PERCENT	>50	ASTM D 4632
PUNCTURE	LBS	55	ASTM D 4833
TRAPEZOID TEAR	LBS	55	ASTM D 4533
APPARENT OPENING SIZE	U.S. SIEVE	not less than 70 (O ₉₅ not greater than 0.212 mm)	ASTM D 4751
PERMITTIVITY	SEC ⁻¹	0.5	ASTM D 4491
ULTRAVIOLET DEGRADATION	PERCENT	50 AT 500 HRS	ASTM D 4355
BURST STRENGTH	PSI	200	ASTM D 3786
SEAM STRENGTH	LBS	140	ASTM D 4632

TABLE 2
MINIMUM PHYSICAL REQUIREMENTS FOR CUSHION GEOTEXTILE⁽¹⁾

PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
MASS PER UNIT AREA	OZ/SQ YD	12	ASTM D 5261
GRAB STRENGTH	LBS	300	ASTM D 4632
ELONGATION BREAK	PERCENT	>50	ASTM D 4632
PUNCTURE	LBS	140	ASTM D 4833
TRAPEZOID TEAR	LBS	115	ASTM D 4533
ULTRAVIOLET DEGRADATION	PERCENT	70 AT 500 HRS	ASTM D 4355
SEAM STRENGTH	LBS	185	ASTM D 4632

Note ⁽¹⁾ GSI GRI GT-12a.

TABLE 3
MINIMUM PHYSICAL REQUIREMENTS FOR
MDE APPLICATION CLASS PE TYPE III GEOTEXTILE⁽¹⁾

PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
GRAB STRENGTH	LBS	200	ASTM D 4632
PUNCTURE	LBS	80	ASTM D 4833
TRAPEZOID TEAR	LBS	80	ASTM D 4533
APPARENT OPENING SIZE	U.S. SIEVE	not less than 70 (O ₉₅ not greater than 0.212 mm)	ASTM D 4751
PERMITTIVITY	SEC ⁻¹	0.10	ASTM D 4491

Note ⁽¹⁾ MD SHA CM, Section 921.09. Maryland application class PE, Type III, nonwoven.

2.1.2 Thread

Sewn seams shall be constructed with high-strength polyester, nylon, or other approved thread type. Thread shall have ultraviolet light stability equivalent to the geotextile and the color shall contrast with the geotextile.

2.2 MANUFACTURING QUALITY CONTROL

The Manufacturer shall be responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be provided. Manufacturing quality control sampling and testing shall be performed in accordance with the manufacturer's approved quality control manual. As a minimum, geotextiles shall be randomly sampled for testing in accordance with ASTM D 4354, Procedure A. Acceptance of geotextile shall be in accordance with ASTM D 4759. Tests not meeting the specified requirements shall result in the rejection of applicable rolls.

PART 3 EXECUTION

3.1 QUALITY ASSURANCE SAMPLES AND TESTS

3.1.1 Quality Assurance Samples

The QC Inspector shall provide assistance to the Contracting Officer in the collection of quality assurance samples. Separation and cushion geotextile samples shall be collected upon delivery to the site for quality assurance testing at a frequency of one per 50,000 square feet. MDE application class PE Type III geotextile is not subject to quality assurance testing requirements. Samples shall be identified with a waterproof marker by manufacturer's name, product identification, lot number, roll number, and machine direction. The date and a unique sample number shall also be noted on the sample. The outer layer of the geotextile roll shall be discarded prior to sampling a roll. Samples shall then be collected by cutting the full-width of the geotextile sheet a minimum of 3 feet long in the machine direction. Rolls which are sampled shall be immediately resealed in their

protective covering.

3.1.2 Quality Assurance Tests

The QC Inspector will provide quality assurance samples to an independent QC laboratory. Samples will be tested to verify that separation and cushion geotextiles meet the requirements for grab, puncture, and tear strengths, elongation, and seam strength specified in Tables 1 and 2. Geotextile product acceptance shall be based on ASTM D 4759. Tests not meeting the specified requirements shall result in the rejection of applicable rolls.

3.2 INSTALLATION

3.2.1 Subgrade Preparation

The surface underlying the geotextile shall be smooth and free of ruts or protrusions which could damage the geotextile. Subgrade materials and compaction requirements shall be in accordance with Section 02315N, "Excavation and Fill."

3.2.2 Placement

The Contractor shall notify the Contracting Officer a minimum of 24 hours prior to installation of geotextile. Geotextile rolls which are damaged or contain imperfections shall be repaired or replaced as directed. The geotextile shall be laid flat and smooth so that it is in direct contact with the subgrade. The geotextile shall also be free of tensile stresses, folds, and wrinkles. On slopes steeper than 10 horizontal on 1 vertical, the geotextile shall be laid with the machine direction of the fabric parallel to the slope direction.

3.3 SEAMS

3.3.1 Overlap Seams

Geotextile panels shall be continuously overlapped a minimum of 12 inches at all longitudinal and transverse joints unless specified otherwise. Where seams must be oriented across the slope, the upper panel shall be lapped over the lower panel. If approved, sewn seams may be used instead of overlapped seams.

3.3.2 Sewn Seams

Factory and field seams shall be continuously sewn on all slopes steeper than 1 vertical on 4 horizontal. The stitch type used shall be flat seam type SSQ-1 401 two-thread locking chain stitch or as recommended by the manufacturer. For field and factory seams which are sewn, the Contractor shall provide at least a 6 1/2 feet sample of sewn seam before the geotextile is installed. For seams that are field sewn, the seams shall be sewn using the same equipment and procedures as will be used for the production seams. If seams are sewn in both the machine and cross machine direction, samples of seams from both directions shall be provided. Separation and cushion geotextile seam strength shall meet the minimum requirements specified in Tables 1 and 2. The minimum distance from the geotextile edge to the stitch line nearest to that edge shall be 3 inches unless otherwise recommended by the manufacturer. The thread at the end of each seam run shall be tied off to prevent unraveling. Skipped stitches or discontinuities shall be sewn with an extra line of stitching with a

minimum of 18 inches of overlap.

3.4 PROTECTION

The geotextile shall be protected during installation from clogging, tears, and other damage. Damaged geotextile shall be repaired or replaced as directed. Adequate ballast (e.g. sand bags) shall be used to prevent uplift by wind. The geotextile shall not be left uncovered for more than 14 days after installation.

3.5 REPAIRS

Torn or damaged geotextile shall be repaired. Clogged areas of geotextile shall be removed. Repairs shall be performed by placing a patch of the same type of geotextile over the damaged area. The patch shall extend a minimum of 12 inches beyond the edge of the damaged area. Patches shall be continuously fastened using a sewn seam or other approved method. The machine direction of the patch shall be aligned with the machine direction of the geotextile being repaired. Geotextile rolls which cannot be repaired shall be removed and replaced. Repairs shall be performed at no additional cost to the Government.

3.6 PENETRATIONS

Engineered penetrations of the geotextile shall be constructed as shown on the drawings.

3.7 COVERING

Geotextile shall not be covered prior to inspection and approval by the Contracting Officer and the QC Inspector. The QC Inspector shall be present during covering of the geotextile. Cover soil shall be placed in a manner that prevents soil from entering the geotextile overlap zone, prevents tensile stress from being mobilized in the geotextile, and prevents wrinkles from folding over onto themselves. Cover materials shall be placed in accordance with Section 02372a, "Waste Containment Geomembrane."

-- End of Section --

SECTION 02374A

GEOSYNTHETIC DRAINAGE LAYER

12/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of the specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 413	(1998; R 2002e1) Rubber Property - Adhesion to Flexible Substrate
ASTM D 1505	(2003) Density of Plastics by the Density-Gradient Technique
ASTM D 3786	(2001) Hydraulic Bursting Strength of Textile Fabrics - Diaphragm Bursting Strength Tester Method
ASTM D 4218	(1996; R 2001) Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique
ASTM D 4491	(1999a) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4595	(1986; R 2001) Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D 4632	(1991; R 2003) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4716	(2003) Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
ASTM D 4751	(1999a) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2000e1) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 5199	(2001) Nominal Thickness of Geosynthetics
ASTM D 5261	(1992; R 2003) Measuring Mass per Unit

Area of Geotextiles

ASTM D 5596

(2003) Microscopic Evaluation of the
Dispersion of Carbon Black in Polyolefin
Geosynthetics

GEOSYNTHETIC INSTITUTE (GSI)

GSI GRI GC-8

(2001) Determination of the Allowable Flow
Rate of a Drainage Geocomposite

1.2 SUBMITTALS

The following shall be submitted in accordance with Section C, Part 7.0 of the basic contract.

SD-03 Product Data

Sampling and Testing

Manufacturer's quality control manual.

Seams and Overlaps

End seam details.

Construction Quality Control Laboratory Qualifications

Qualifications of Construction Quality Control laboratory.

SD-04 Samples

Geosynthetic Drainage Layer

One properly identified 24 by 24 inch minimum size geosynthetic drainage layer sample with any attached geotextiles. The fasteners proposed for use shall also be submitted.

SD-06 Test reports

Sampling and Testing

Construction quality control test results.

Geosynthetic Drainage Layer

Manufacturer's quality control test results. Test results not meeting the requirements in Table 1 will result in rejection of applicable rolls.

1.3 CONSTRUCTION QUALITY CONTROL LABORATORY QUALIFICATIONS

The construction quality control (QC) laboratory shall have provided QC and/or quality assurance (QA) testing of geosynthetic drainage layers for at least five completed projects having a total minimum area of 2 million square feet. The QC laboratory shall carry current accreditation via the Geosynthetic Accreditation Institute's Laboratory Accreditation Program (GAI-LAP) for the tests the QC laboratory will be required to perform.

1.4 DELIVERY, STORAGE AND HANDLING

Geosynthetic drainage layer material shall not be damaged during shipping, storage, or handling. Any drainage layer material found to be damaged shall be repaired or replaced. Material shall be delivered only after the required submittals have been approved. Each roll shall be labeled with the manufacturer's name, product identification, lot number, roll number, and roll dimensions. Rolls that have attached geotextiles shall be individually wrapped in plastic.

1.4.1 Delivery

The QC Inspector shall be present during delivery and unloading of the geosynthetic drainage layer material.

1.4.2 Storage

Geosynthetic material shall be protected from becoming saturated. Rolls shall either be elevated off the ground or placed on a sacrificial sheet of plastic. Geosynthetic rolls shall also be protected from the following: dust, dirt, construction equipment, ultraviolet radiation, chemicals, sparks and flames, temperatures in excess of 160 degrees F, and any other environmental conditions that may damage the physical properties of the geosynthetic.

1.4.3 Handling

Geosynthetic rolls shall be handled and unloaded with load carrying straps, a fork lift with stinger bar, or an axle bar assembly. Rolls shall not be dragged along the ground, lifted by one end, or dropped to the ground.

PART 2 PRODUCTS

2.1 GEOSYNTHETIC DRAINAGE LAYER

The polymer used to manufacture the geonet component of the geosynthetic drainage layer shall be polyethylene which is clean and free of any foreign contaminants. Regrind material which consists of edge trimmings and other scraps may be used to manufacture the geonet; however, post-consumer recycled materials shall not be used. The geosynthetic drainage layer shall conform to the property requirements listed in Table 1 and shall be free of defects. Where applicable, Table 1 property values represent minimum average roll values (MARV) in the weakest principal direction.

2.2 PROPERTIES

The geonet shall be covered on both sides with nonwoven needle punched geotextile. The use of heat calendered geotextile will not be allowed. Geocomposite shall be created by heat bonding geotextile to the geonet. Geotextile attached to the geocomposite shall meet the requirements listed in Table 1. Value for AOS represents minimum value and corresponding 95 percent opening size (O_{95}) represents the maximum value.

TABLE 1 - GEOSYNTHETIC DRAINAGE LAYER PROPERTIES

PROPERTY	TEST METHOD	TEST VALUE	MINIMUM TESTING FREQUENCY
GEONET			
Thickness, minimum average	ASTM D 5199	225 mil	40,000 sq ft
Thickness, lowest individual	ASTM D 5199	-10 percent	40,000 sq ft
Polymer Density, minimum	ASTM D 1505	0.940 g/cc	Note 4
Carbon Black Content	ASTM D 4218	2 to 3 percent	40,000 sq ft
Carbon Black Dispersion	ASTM D 5596	Note 1	Note 4
Tensile Strength	ASTM D 4595	58 lbs/in	40,000 sq ft
GEOTEXTILES			
Mass/Unit Area, minimum	ASTM D 5261	6.0 oz/sy	40,000 sq ft
Grab Strength	ASTM D 4632	160 lbs	40,000 sq ft
Puncture	ASTM D 4833	55 lbs	40,000 sq ft
Trapezoid Tear	ASTM D 4533	55 lbs	40,000 sq ft
Permittivity	ASTM D 4491	0.5/sec	Note 4
AOS (U.S. Sieve)	ASTM D 4751	not less than 70 (O ₉₅ not greater than 0.212 mm)	Note 4
Burst Strength	ASTM D 3786	200 lbs	40,000 sq ft
Seam Strength	ASTM D 4632	140 lbs	Note 4
GEOCOMPOSITE			
Transmissivity	ASTM D 4716 & GSI GRI GC-8	4.0 x 10 ⁻³ m ² /sec	Note 4 & Note 2
including attached geotextiles			
Geonet/Geotextile Adhesion	ASTM D 413	1.0 lbs/inch	Note 4 and Note 3

NOTES:

- (1) Carbon black dispersion for 10 different views:
Minimum 9 of 10 in Categories 1 or 2; and
All 10 in Categories 1, 2, or 3.

- (2) Manufacturing quality control transmissivity tests shall be measured with boundary conditions as follows: steel plate / Ottawa sand / geocomposite / 60 mil HDPE geomembrane / steel plate (with the flat side of the geocomposite facing soil) using water at 20 degrees C

with a gradient of 0.33 under a normal pressure of 1,000 psf. A minimum seating period of 100 hours shall be used.

(3) Average of five equally spaced tests across the roll width.

(4) Once per project.

2.3 SAMPLING AND TESTING

2.3.1 Manufacturing Quality Control Testing

Manufacturing quality control test methods and frequencies shall be in accordance with Table 1 unless otherwise approved.

2.3.2 Construction Quality Control Testing

A minimum of one construction quality control transmissivity test shall be performed in accordance with ASTM D 4716 and the requirements of this paragraph. Transmissivity shall be measured using water at 68 degrees F at gradients of 0.1 and 0.5 or 0.2857 under a normal pressure of 1,000 pounds per square foot. Transmissivity test profile shall consist of select fill/geocomposite/textured 40 mil LLDPE using the same soil and geosynthetic materials used for full scale construction. Geotextile shall be attached to the geonet in the same configuration as will be used in the field. Geocomposite shall be oriented in the same direction as will be used in the field. A minimum seating period of 100 hours shall be used. The construction quality control test results must demonstrate a minimum transmissivity of $2.2 \times 10^{-4} \text{ m}^2/\text{sec}$ at a gradient of 0.2857 and after the minimum 100 hour seating period.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Surface Preparation

Prior to placement of the geosynthetic drainage layer, the subgrade shall be cleaned of all materials which could damage the drainage layer.

3.1.2 Placement

The geosynthetic drainage layer shall not be damaged during placement. Faulty or damaged material shall be replaced or repaired as specified in paragraph entitled "REPAIRS". The drainage layer shall be unrolled in the direction of maximum slope, keeping the net flat against the subgrade to minimize wrinkles and folds. The drainage layer shall not be dragged across textured geomembrane if a geotextile is attached to the surface facing the geomembrane. Adequate ballast (e.g. sandbags) shall be placed to prevent uplift by wind prior to covering. During placement of geocomposite, care shall be taken not to entrap dirt or dust in the geotextile or geonet that could cause clogging of the system. Dirt or dust entrapped shall be washed clean with water prior to placement of the next material on top of it. Care should be taken with the handling of sandbags to prevent rupture or damage of the sandbags.

3.1.3 Seams and Overlaps

3.1.3.1 Geonet Side Seams

Geonet side seams shall be overlapped a minimum of 4 inches. Side seam fastener spacing shall be a maximum of 5 feet. In anchor trenches, fastener spacing shall be a maximum of 1 foot.

3.1.3.2 Geonet End Seams

Geonet end seams shall be overlapped a minimum of 1 foot. End seam fastener spacing shall be a maximum of 6 inches. The overlaps shall be in the direction of flow. End seams shall not be allowed on side slopes steeper than 4 horizontal on 1 vertical.

3.1.3.3 Geonet Fasteners

Geonet rolls shall be tied together with plastic fasteners. The fasteners shall be a contrasting color from the geonet and attached geotextiles. Metallic fasteners will not be allowed.

3.1.3.4 Geotextile Seams

The bottom layers of geotextile shall be overlapped. The top layer of geotextile shall be continuously sewn in accordance with Section 02373, "Geotextile." Geotextiles shall be overlapped a minimum of 4 inches prior to sewing. Holes placed in geotextile to allow seaming of geonet rolls shall be covered by placing geotextile cap strips. Cap strips shall be a minimum of 2 feet in width and shall be thermally bonded to the geotextile component of the geocomposite.

3.1.3.5 Geocomposite Edges

Cap strips shall be placed over any exposed edges of geocomposite. Cap strips shall be as described in paragraph entitled "Geotextile Seams."

3.1.4 Stacked Geosynthetic Drainage Layers

When geosynthetic drainage layers are to be stacked, roll ends and edges shall be staggered so that joints do not lie above one another. Stacked layers shall be laid in the same direction and in a manner that prevents interlocking.

3.2 REPAIRS

3.2.1 Geonet Damage

Repairs shall be made by placing a patch of the geosynthetic drainage layer over the damaged area. The patch shall extend a minimum of 2 feet beyond the edge of the damage. Geonet fasteners, spaced every 6 inches around the patch, shall be used to hold the patch in place. If more than 25 percent of the roll width is damaged, approval must be obtained to repair or replace the damaged roll.

3.2.2 Geotextile Damage

Damaged geotextile shall be repaired by placing a patch of geotextile over the damaged area with a minimum of 12 inches of overlap in all directions. The geotextile patch shall be thermally bonded in place.

3.3 PROTECTION AND BACKFILLING

The geosynthetic drainage layer shall be covered with the specified materials within 14 days of acceptance. The QC Inspector shall be present during covering of the geosynthetic drainage layer. Cover materials shall be placed in accordance with Section 02372a, "Waste Containment Geomembrane."

-- End of Section --

SECTION 02510N

WATER DISTRIBUTION

09/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASME INTERNATIONAL (ASME)

ASME B18.2.2	(1987; R 1999) Square and Hex Nuts (Inch Series)
ASME B18.5.2.1M	(1996; R 2003) Metric Round Head Short Square Neck Bolts
ASME B18.5.2.2M	(1982; R 2000) Metric Round Head Square Neck Bolts

ASTM INTERNATIONAL (ASTM)

ASTM A 47/A 47M	(1999) Ferritic Malleable Iron Castings
ASTM A 48/A 48M	(2003) Gray Iron Castings
ASTM A 307	(2003) Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
ASTM A 536	(1984; R 1999e1) Ductile Iron Castings
ASTM A 563	(2004) Carbon and Alloy Steel Nuts
ASTM C 94/C 94M	(2004) Ready-Mixed Concrete
ASTM D 3139	(1998) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F 477	(2002e1) Elastomeric Seals (Gaskets) for Joining Plastic Pipe

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C104	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110	(1998) Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in. (75 mm Through 1200 mm), for Water and Other Liquids
AWWA C111	(2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

AWWA C153	(2000) Ductile-Iron Compact Fittings, 3 in. Through 24 in. (76 mm Through 610 mm) and 54 in. Through 64 in. (1,000 mm Through 1,600 mm), for Water Service
AWWA C500	(2002; A C500a-95) Metal-Seated Gate Valves for Water Supply Service
AWWA C502	(1994) Dry-Barrel Fire Hydrants
AWWA C509	(2001) Resilient-Seated Gate Valves for Water and Sewerage Systems
AWWA C600	(1999) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C900	(1997) Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution
AWWA M23	(2002) Manual: PVC Pipe - Design and Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(2002) Installation of Private Fire Service Mains and Their Appurtenances
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UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-3	(1992) Installation of Polyvinyl Chloride (PVC) Pressure Pipe
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UNDERWRITERS LABORATORIES (UL)

UL 246	(1993; Rev thru Dec 1998) Hydrants for Fire-Protection Service
UL 262	(1994; Rev thru Dec 1998) Gate Valves for Fire-Protection Service

1.2 DESIGN REQUIREMENTS

1.2.1 Water Distribution Mains

Provide water distribution mains indicated as 6 or 8 inch lines of polyvinyl chloride (PVC) plastic pipe. Provide water main accessories and gate valves as specified and where indicated.

1.3 SUBMITTALS

Submit the following in accordance with Section C of the basic contract.

SD-03 Product Data

Piping Materials

Water distribution main piping, fittings, joints, valves, and coupling

Hydrants

Valve boxes

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

SD-07 Certificates

Water distribution main piping, fittings, joints, valves, and coupling

Lining

Fire hydrants

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

SD-08 Manufacturer's Instructions

Installation procedures for water piping

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets that are not to be installed immediately under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

1.4.2 Handling

Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench. Store plastic piping, jointing materials and rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

PART 2 PRODUCTS

2.1 WATER DISTRIBUTION MAIN MATERIALS

2.1.1 Piping Materials

2.1.1.1 Polyvinyl Chloride (PVC) Plastic Piping

- a. Pipe and Fittings: Pipe, AWWA C900, shall be plain end or gasket bell end, Pressure Class 200 (DR 14) with cast-iron-pipe-equivalent OD. Fittings shall be gray iron or ductile iron, AWWA C110 or AWWA C153, and have cement-mortar lining, AWWA C104, standard thickness. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe specified in this paragraph.
- b. Joints and Jointing Material: Joints for pipe shall be push-on joints, ASTM D 3139. Joints between pipe and metal fittings, valves, and other accessories shall be push-on joints ASTM D 3139, or compression-type joints/mechanical joints, ASTM D 3139 and AWWA C111. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe, ASTM F 477. Gaskets for push-on joints and compression-type joints/mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories, AWWA C111, respectively, for push-on joints and mechanical joints. Mechanically coupled joints using a sleeve-type mechanical coupling, as specified in paragraph entitled "Sleeve-Type Mechanical Couplings," may be used as an optional jointing method in lieu of push-on joints on plain-end PVC plastic pipe, subject to the limitations specified for mechanically coupled joints using a sleeve-type mechanical coupling and to the use of internal stiffeners as specified for compression-type joints in ASTM D 3139.

2.1.2 Valves, Hydrants, and Other Water Main Accessories

2.1.2.1 Gate Valves on Buried Piping

AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be nonrising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for the adjoining pipe, (2) AWWA C509 shall be nonrising stem type with mechanical-joint ends, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 175 psi, and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have O-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. In lieu of mechanical-joint ends and push-on joint ends, valves may have special ends for connection to sleeve-type mechanical coupling. Valve ends and gaskets for connection to sleeve-type mechanical coupling shall conform to the applicable requirements specified respectively for the joint or coupling. Where a post indicator is shown, the valve shall have an indicator post flange; indicator post flange for AWWA C500

valve shall conform to the applicable requirements of UL 262. Valves shall be of one manufacturer.

2.1.2.2 Fire Hydrants

Dry-barrel type. Paint hydrants with at least one coat of primer and two coats of yellow enamel paint, except use red enamel paint for tops of hydrants in non-potable water systems. Stencil hydrant number and main size on the hydrant barrel using black stencil paint.

- a. Dry-Barrel Type Fire Hydrants: Dry-barrel type hydrants, AWWA C502 or UL 246, "Base Valve" design, shall have 6 inch inlet, 5 1/4 inch valve opening, one 4 1/2 inch pumper connection, and two 2 1/2 inch hose connections. Pumper connection and hose connections shall be individually valved with independent nozzle gate valves. Inlet shall have mechanical-joint or push-on joint end subject to the approval of the Public Works Department and the Contracting Officer; end shall conform to the applicable requirements as specified for the joint. Size and shape of operating nut, cap nuts, and threads on hose and pumper connections shall be as specified in AWWA C502 or UL 246. Hydrants indicated as "traffic type," shall have frangible sections as mentioned in AWWA C502. The traffic type hydrant shall have special couplings joining upper and lower sections of hydrant barrel and upper and lower sections of hydrant stem subject to the approval of the Public Works Department and the Contracting Officer and shall be designed to have the special couplings break from a force not less than that which would be imposed by a moving vehicle; hydrant shall operate properly under normal conditions.

2.1.2.3 Valve Boxes

Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast iron or precast concrete, heavy duty traffic rated, of a size suitable for the valve on which it is to be used, adjustable, and shall have an internal debris cap with lock. Provide a round head. Cast the word "RIVER WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches. Cast-iron box shall have a heavy coat of bituminous paint.

2.1.2.4 Sleeve-Type Mechanical Couplings

Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For ductile iron and PVC plastic pipe, the middle ring shall be of cast-iron or steel; and the follower rings shall be of malleable or ductile iron. Cast iron, ASTM A 48/A 48M, not less than Class 25. Malleable and ductile iron shall conform to ASTM A 47/A 47M and ASTM A 536, respectively. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111. Bolts shall be track-head type, ASTM A 307, Grade A, with nuts, ASTM A 563, Grade A; or round-head square-neck type bolts, ASME B18.5.2.1M and ASME B18.5.2.2M with hex nuts, ASME B18.2.2. Bolts shall be 5/8 inch

in diameter; minimum number of bolts for each coupling shall be 4 for 6 inch diameter pipe and 6 for 8 inch diameter pipe. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

3.1.1 General Requirements for Installation of Pipelines

These requirements shall apply to all pipeline installation except where specific exception is made in the paragraph entitled "Special Requirements for Installation of Water Mains."

3.1.1.1 Location of Water Lines

Where the location of the water line is not clearly defined by dimensions on the drawings, do not lay water line closer than 10 feet horizontally from any sewer line. Where water lines cross under gravity sewer lines, encase sewer line fully in concrete for a distance of at least 10 feet on each side of the crossing, unless sewer line is made of pressure pipe with rubber-gasketed joints and no joint is located within 3 feet horizontally of the crossing. Lay water lines which cross sewer force mains and inverted siphons at least 2 feet above these sewer lines; when joints in the sewer line are closer than 3 feet horizontally from the water line, encase these joints in concrete. Do not lay water lines in the same trench with gas lines, fuel lines or electric wiring.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 02315N, "Excavation and Fill."

3.1.1.3 Pipe Laying and Jointing

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover

over top of pipe shall not be less than 5 feet.

3.1.1.4 Installation of Warning and Identification Tape and Detection Wire

Provide in accordance with Section 02315N, "Excavation and Fill."

3.1.2 Special Requirements for Installation of Water Mains

3.1.2.1 Installation of PVC Plastic Water Main Pipe

Installation of PVC Plastic Water Main Pipe and Associated Fittings: Unless otherwise specified, install pipe and fittings with minimum interruption of service in accordance with paragraph entitled "General Requirements for Installation of Pipelines"; with the requirements of UBPPA UNI-B-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7, "Installation."

- a. Jointing: Make push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel; for push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of UBPPA UNI-B-3 for laying the pipe and the recommendations in AWWA M23, Chapter 7, "Installation," for pipe joint assembly. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories and with the applicable requirements of AWWA C600 for joint assembly. Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint; assemble in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111. Cut off spigot end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.
- b. Pipe Anchorage: Provide concrete thrust blocks (reaction backing) and metal harness for pipe anchorage as indicated and subject to the approval of the Public Works Department and the Contracting Officer. Thrust blocks shall be in accordance with the requirements of UBPPA UNI-B-3 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94/C 94M, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength. Metal harness shall be in accordance with the

requirements of AWWA C600 for thrust restraint, using tie rods and clamps as shown in NFPA 24.

3.1.2.2 Installation of Valves and Hydrants

- a. Installation of Valves: Install gate valves, AWWA C500 and UL 262, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C500. Install gate valves, AWWA C509, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C509. Install gate valves on PVC water mains in accordance with the recommendations for appurtenance installation in AWWA M23, Chapter 7, "Installation", subject to the approval of the Public Works Department and the Contracting Officer. Make and assemble joints to gate valves as specified for making and assembling the same type joints between pipe and fittings.
- b. Installation of Hydrants: Install hydrants, except for metal harness, in accordance with AWWA C600 for hydrant installation and as indicated. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Provide metal harness as specified under pipe anchorage requirements for the respective pipeline material to which hydrant is attached. Install hydrants adjacent to paved areas, accessible to fire department apparatus, no closer than 3 feet or no farther than 7 feet from the roadway shoulder or curb line. Install hydrants with the 4 1/2 inch connections facing the adjacent paved surface. If there are two paved adjacent surfaces, contact the Contracting Officer for further instructions. Installation is subject to the approval of the Public Works Department and the Contracting Officer.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete.

3.2.2 Testing Procedure

Test water mains in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements" and subject to the approval of the Public Works Department and the Contracting Officer. Test ductile-iron water mains in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints or push-on joints shall not exceed the amounts given in AWWA C600; no leakage will be allowed at joints made by any other method. Test PVC plastic water mains in accordance with the requirements of UBPPA UNI-B-3 for pressure and leakage tests. The amount of leakage on pipelines

made of PVC plastic water main pipe shall not exceed the amounts given in UBPPA UNI-B-3, except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed.

3.2.3 Special Testing Requirements

For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system (175 psi), except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

-- End of Section --

SECTION 02525N

MONITORING WELLS
09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 53/A 53M	(2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 312/A 312M	(2003) Seamless and Welded Austenitic Stainless Steel Pipes
ASTM C 150	(2002ae1) Portland Cement
ASTM D 1586	(1999) Penetration Test and Split-Barrel Sampling of Soils
ASTM D 1587	(2000) Thin-Walled Tube Sampling of Soils for Geotechnical Purposes
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2488	(2000) Description and Identification of Soils (Visual-Manual Procedure)
ASTM D 4397	(2002) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM D 5088	(2002) Decontamination of Field Equipment Used at Nonradioactive Waste Sites
ASTM D 5092	(2004) Design and Installation of Ground Water Monitoring Wells in Aquifers
ASTM F 480	(2002) Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80
ASTM F 883	(1997) Padlocks

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)

COMAR 26.04.04	Department of Environment; Regulation of Water Supply, Sewage Disposal, and Solid Waste; Well Construction
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U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 600/4-89-034	(1989) Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells
EPA 600/4-79/020	(1984) Methods for Chemical Analysis of Water and Wastes

1.2 DESCRIPTION OF WORK

Abandon existing and provide new monitoring wells including drilling, casing, riser, well screen, gravel packing, grouting, development, monitoring device, and incidental related work complete and ready for operation.

1.3 GENERAL REQUIREMENTS

Each system, including equipment, materials, installation, and performance, shall be in accordance with local, State, and Federal regulations, ASTM D 5092, and EPA 600/4-89-034 except as modified herein. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" has been substituted for the word "should" wherever it appears. Reference to the "Project Representative" and the "Owner" shall be interpreted to mean the Contracting Officer. Mark and secure monitoring wells to avoid unauthorized access and tampering.

1.4 SUBMITTALS

Submit the following in accordance with Section C of the basic contract.

SD-02 Shop Drawings

Well construction

SD-03 Product Data

Well riser

Well screen

Filter pack

Cement/bentonite grout

Bentonite pellet seal

SD-07 Certificates

Well Drilling/Development Material Handling Plan

Field Sampling and Laboratory Testing Plan

Treatment facility permit

Installation Survey Report

Well Development Report

Well Abandonment Report

Borehole Analysis Report

SD-11 Closeout Submittals

Well Construction Permit

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials in an undamaged condition. Unload and store with minimal handling. Store materials in on-site enclosures or under protective coverings. Store plastic piping and jointing materials under cover, out of direct sunlight. Store materials off the ground. Keep insides of pipes and fittings free of dirt and debris. Replace defective or damaged materials with new materials.

1.6 QUALITY ASSURANCE

1.6.1 Required Drawings

Submit well construction drawings showing components and details of well riser, protective outer casing, well screen, filter pack, annular seal, and associated items. Drawings shall be prepared by a State certified professional geologist or hydrogeologist, or by a State registered professional civil engineer, hereafter referred to as the Contractor's Professional Consultant (CPC). Drawings shall be sealed.

1.6.2 Well Drilling/Development Material Handling Plan

A material handling plan shall be furnished by the Contractor 15 days prior to initiation of the work that describes phases of dealing with the potentially contaminated soil and groundwater, including the following: a schedule to be employed in the well drilling and development stages, a sequence of operations, the method of drilling and development, material hauling, proposed equipment, handling of the contaminated materials, soil and water testing requirements, and safety precautions and requirements.

1.6.3 Health and Safety Plan (HASP)

Provide in accordance with Section 01115N, "General Paragraphs (Remedial Action Contracts)."

1.6.4 Field Sampling and Laboratory Testing Plan

Describe field sampling methods and quality control procedures. Identify laboratory and laboratory methods to be used for contamination testing. Sample reports shall show sample identification for location, date, time, sample method, contamination level, name of individual sampler, identification of laboratory, and quality control procedures.

1.6.5 Treatment Facility Permit

Verification that the proposed treatment facility is permitted to accept the contaminated materials specified, prior to the start of excavation.

1.6.6 Well Development Report

Provide report, containing the following data for each well: project name

and location, well designation, date and time of well installation, date and time of well development, static water level from top of well riser reference point before development and 24 hours after development, field measurements of pH, temperature, and specific conductivity, depth of well from top of riser to bottom of well, screen length, description of development methodology size/capacity of pump or bailer, pumping rate, and recharge rate.

1.6.7 Well Abandonment Report

Submit a completed well abandonment report to the appropriate state agency after abandonment.

1.6.8 Well Construction Permit

Submit a completed permit application and a proposed method of construction to the appropriate state agency prior to construction of the well. Construction of the wells will not be allowed until an approved Well Construction Permit has been submitted to the Contracting Officer.

PART 2 PRODUCTS

2.1 WELL RISER

2.1.1 PVC Piping

ASTM F 480, Type 1, Grade 1, PVC 12454, NSF wc or NSF pw, Schedule 40, with flush threaded joint fittings. Threaded joints shall be wrapped with fluoropolymer tape, and provided with nitrile O-ring gaskets.

2.1.2 Well Riser Cap

Provide cap on top of the well riser. Cap shall be a flush threaded cap and of the same material as the well riser.

2.2 WELL SCREEN

Well screens shall be located as indicated. The length of each screen shall be as indicated. Slot size shall be 0.010 inch. Slotted openings shall be distributed uniformly around the circumference of the screen. Open area shall approach the formation's natural porosity.

2.2.1 Stainless Steel Screens

ASTM A 312/A 312M, Type 304, Schedule 40S, continuous slot construction, wire wound, with flush threaded joint ends.

2.3 PRIMARY FILTER PACK

Provide clean, durable, well-rounded, and washed quartz or granite, with less than 5 percent non-siliceous material. The filter pack shall not contain organic matter or friable materials. The filter pack shall allow free flow of water in the well, and shall prevent the infiltration of aquifer materials. Filter pack shall have 100 percent passing the U.S. Standard Number 20 sieve and 100 percent retained on the U.S. Standard Number 30 sieve.

2.4 ANNULAR SEALANTS

2.4.1 Bentonite Pellet Seal

Provide pelletized sodium montmorillonite in sealed containers from a commercial source, free of impurities. Diameter of pellets shall be less than one fifth the diameter of the borehole annular space to prevent bridging.

2.4.2 Cement/Bentonite Grout

Provide cement/bentonite grout in accordance with ASTM D 5092, typical cement base grout with 4 percent bentonite by weight. Cement shall be in accordance with ASTM C 150. Quick setting admixtures shall not be allowed. Drilling mud or cuttings shall not be used as a sealing material.

2.5 BOTTOM PLUGS

Provide flush threaded solid plug at the bottom of the well. Plug shall be the same material as the well screen to which it is attached. Joints shall be provided with nitrile O-ring gaskets.

2.6 LOCKING WELL CAP

Provide flush threaded, weatherproof, and non-removable locking well cap on the top of the well. Well cap shall be of the same material as the well protective casing to which it is attached. Well cap shall accommodate padlock. Provide a long shackled padlock in accordance with ASTM F 883. Provide two keys for the padlock, and turn them over to the Contracting Officer. Locks at the site shall be keyed alike.

2.7 WELL HEAD COMPLETIONS

Clearly mark and secure the well to avoid unauthorized access and tampering. Cast the words "MONITORING WELL" on the well head cover. Provide a sign reading, "WELL IS FOR MONITORING AND IS NOT SAFE FOR DRINKING." Provide stamped metal identification tag as follows:

DO NOT DISTURB
ID #: _____ Date: _____
Installed By: _____
Total Depth: _____
Screened Interval: _____
Top of Riser Elevation: _____
Other: _____
For Information, Call: _____

2.7.1 Aboveground Completions

Provide protective outer casing around the well riser extending above grade. The diameter of the protective outer casing shall be a minimum of 4 inches larger than the well riser diameter. The top of the protective outer casing shall extend a minimum of 6 inches above the top of the well riser cap. The protective outer casing shall be set in cement/bentonite grout and the bottom of the protective well casing shall extend to the depth indicated. A 1/4 inch diameter weep hole shall be drilled in the protective outer casing 3 inches above the ground surface. The annular space between the protective outer casing and the well riser shall be filled with pea gravel or coarse sand to just below the level of the well

riser cap. Provide locking well cap on top of the protective outer casing. Provide 6 inch diameter steel pipe bollards, filled with concrete as indicated to protect the exposed well head.

2.7.1.1 Protective Outer Casing and Bollards

ASTM A 53/A 53M, Type E or S, Grade B.

2.7.1.2 Well Casing Cap

Locking well cap shall be flush threaded and of the same material as the protective outer casing. Threaded joints shall be provided with nitrile O-ring gaskets.

2.8 POLYETHYLENE SHEETING

ASTM D 4397.

PART 3 EXECUTION

3.1 GENERAL

Notify the Contracting Officer at least 15 days prior to commencement of work. Final locations of wells shall be obtained from the Contracting Officer. Abandonment of existing and drilling, installation, and development of the proposed monitoring wells shall be supervised, directed, and monitored by the CPC. Drilling, sampling, and well development equipment introduced to the well shall be decontaminated before and after each use in accordance with ASTM D 5088.

3.2 DRILLING

Borehole shall be advanced using conventional 4-1/4 inch ID hollow-stem auger drilling methods. If it is the opinion of the CPC that an alternate drilling method is required, justification for a boring method change shall be submitted to the Contracting Officer, and approval for the change granted prior to drilling. Drill crew shall be experienced and trained in drilling and safety requirements for contaminated sites.

3.2.1 Sampling

Obtain samples in accordance with ASTM D 1586 or ASTM D 1587. Perform standard penetration tests at the following intervals: 0.0 to 2.0 feet below ground surface (bgs); 2.0 to 4.0 feet bgs; 4.0 to 6.0 feet bgs; and at 5 foot centers or at changes in lithology thereafter for the total depth of boring. Each soil sample shall be screened in the field with an organic vapor analyzer/flame ionization device (OVA/FID) capable of detecting vapors to a minimum of one ppm. Log boring in accordance with ASTM D 2487 and ASTM D 2488. Groundwater elevation shall be indicated.

3.2.2 Analysis

The CPC shall review the log data from each borehole and compare the data with the well design requirements. The CPC shall verify the adequacy of the well design, or shall offer a proposed modification to the design based on the geologic and hydrogeologic data obtained from the borehole. This review and analysis shall be conducted for each borehole. The CPC shall submit the borehole boring logs, the analysis of the well design, and any proposed design modifications to the Contracting Officer in a Borehole

Analysis Report. Any modifications to the well design approved by the Contracting Officer shall be considered a change to the contract documents and shall be negotiated in accordance with the "CHANGES" clause.

3.2.3 Alignment

Verify that the well is straight and plumb by lowering a 10 foot section of decontaminated 1 inch diameter steel pipe into the well.

3.3 SOIL REMOVED FROM THE BOREHOLE

3.3.1 Temporary Containment of Soil Removed from the Borehole

Soil removed from the borehole shall be disposed off-site. Provide a temporary containment area near the well site. Cover containment area with 10 mil reinforced polyethylene sheeting. Place soil removed from the boreholes on the impervious barrier and cover with 6 mil reinforced polyethylene sheeting. Provide a straw bale berm around the outer limits of the containment area and cover with polyethylene sheets. Secure edges of sheets with weights to keep the polyethylene sheeting in place. Water runoff shall be diverted from the stockpiled material. As an option, soil may be stockpiled in trucks suitable for transporting contaminated soils as specified herein.

3.3.2 Testing and Disposal Requirements for Stockpiled Soils

In accordance with Section 01575N, "Temporary Environmental Controls" and Section 02223, "Transportation and Disposal of Contaminated Material."

3.4 WELL INSTALLATION

Well installation shall be in accordance with ASTM D 5092 and EPA 600/4-89-034, and as indicated on the well construction drawings submitted by the CPC and approved by the Contracting Officer. Borehole shall be stable and shall be verified straight before beginning installation.

3.4.1 Risers and Screens

Well risers, screens, plugs, and caps shall be decontaminated prior to delivery by the manufacturer and shall be certified clean. Materials shall be delivered, stored, and handled in such manner as to ensure that grease, oil, or other contaminants do not contact any portion of the well screen and riser assembly prior to installation. A clearly-established reference point shall be provided on the upper edge of the riser pipe. Reference point shall consist of a 1/4-inch V shaped notch. Unless otherwise directed by the Contracting Officer, the well screen and riser assembly shall be cleaned with high pressure water prior to installation. Personnel shall wear clean cotton or surgical gloves while handling the assembly. Unless otherwise directed by the Contracting Officer, centralizers shall be used to ensure that the well screen and riser assembly is installed concentrically in the borehole. When the assembly has been installed at the appropriate elevation, it shall be adequately secured to preclude movement during placement of the filter packs and annular seals. The top of the well riser shall be capped during filter pack placement.

3.4.2 Primary Filter Pack

Prior to commencement of work, equipment and methods required to place filters shall be approved by the Contracting Officer. Primary filter pack

shall be placed as indicated on the approved well construction drawings to fill the entire annular space between the screen and riser assembly and the outside wall of the borehole. Place the primary filter pack material with a tremie pipe in accordance with EPA 600/4-89-034 and ASTM D 5092. Placement of the primary filter pack by gravity or free fall methods is not allowed. Control speed of filter placement to prevent bridging and to allow for settlement.

3.4.3 Bentonite Seal

Bentonite pellets shall be placed through a tremie pipe. Control speed of bentonite pellet placement to prevent bridging. Additional water shall be added to the annular space as directed by the CPC to ensure complete hydration of the bentonite. Bentonite pellets shall cure a minimum of 48 hours before the placement of cement/bentonite grout to ensure complete hydration and expansion of the bentonite pellets.

3.4.4 Cement/Bentonite Grout

Cement/bentonite grout shall be placed in the annular space above the bentonite seal as indicated on the well construction drawings. Grout shall be placed as a slurry through a tremie pipe, and injected under pressure to reduce chance of voids. Grout shall be injected in one continuous operation until full strength grout flows out at the ground surface without evidence of drilling cuttings or fluid. Cement/bentonite grout shall cure a minimum of 48 hours before beginning well development operations.

3.4.5 Well Head Completions

Well head completions shall be as indicated and as specified herein.

3.5 WELL DEVELOPMENT

Well development shall be in accordance with EPA 600/4-89-034 and ASTM D 5092 except as modified herein. Bailing, surging, and pumping/overpumping/backwashing are acceptable development methods. Air surging and jetting are prohibited. Method of development shall be chosen by the CPC and approved by the Contracting Officer. Well development shall not begin until the well installation is complete and accepted by the Contracting Officer. Well development operations shall be conducted continuously until development water flows clear and free of drilling fluids, cuttings, or other materials. At such time representative water samples shall be tested for pH, temperature, specific conductivity, and turbidity in accordance with EPA 600/4-79/020. Samples shall be taken every 5 minutes. When stabilized readings of these parameters, as accepted by the Contracting Officer, have been achieved for 3 consecutive sets of readings well development operations shall cease.

3.6 WATER FROM WELL DEVELOPMENT OPERATIONS

Water from the well development operations shall be containerized in accordance with State and local regulations and transported and disposed in accordance with Section 01575N, "Temporary Environmental Controls" and Section 02223, "Transportation and Disposal of Contaminated Material."

3.7 INSTALLATION SURVEY

Upon completion of well installation and development and acceptance by the Contracting Officer therefore, the vertical and horizontal position of each

well shall be determined by a registered land surveyor licensed in the State of Maryland. The survey shall document the vertical elevations (NGVD29) of the top of the protective outer casing, top of the riser pipe at the reference point location, and the ground surface elevation adjacent to the north side of each well. The survey shall also determine the horizontal location of each well based on the NAD83 coordinate system. Survey elevations shall be accurate to the nearest 0.01 foot and horizontal locations to the nearest 0.1 foot. Survey shall include a description of the riser reference point. Survey data shall be submitted with a well location map as the Installation Survey Report.

3.8 CLEANUP

Upon completion of the well construction, remove debris and surplus materials from the jobsite.

3.9 WELL ABANDONMENT

COMAR 26.04.04.

-- End of Section --

SECTION 02620A
SUBDRAINAGE SYSTEM
09/01

PART 1 GENERAL

1.1 REFERENCES

The publication listed below form a part of this specification to the extent referenced. The publication is referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 252M (1996). Corrugated Polyethylene Drainage
Tubing

1.2 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0 of the basic contract.

SD-04 Samples

Pipe for Subdrains

Samples of pipe, and pipe fittings, before starting the work.

SD-07 Certificates

Pipe for Subdrains

Certifications from the manufacturers attesting that materials meet specification requirements. Certificates are required for drain pipe and fittings.

1.3 DELIVER, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with minimum handling. Materials shall not be stored directly on the ground. The pipes and fittings shall be kept free of dirt and debris. Plastic pipe shall be installed within 6 months from the date of manufacture unless otherwise approved.

1.3.2 Handling

Materials shall be handled in such a manner as to insure delivery to the trench in sound undamaged condition. Pipe shall be carried and not dragged to the trench.

PART 2 PRODUCTS

2.1 PIPE FOR SUBDRAINS

Pipe for subdrains shall be of the types and sizes indicated.

2.1.1 Plastic Pipe

Plastic pipe shall contain ultraviolet inhibitor to provide protection from exposure to direct sunlight.

2.1.1.1 Corrugated Polyethylene (PE) Pipe and Fittings

AASHTO M 252M Type S with minimum pipe stiffness of 50 pounds per square inch at 5 percent deflection. Solid or perforated as indicated. Fittings shall provide sufficient longitudinal strength to preserve alignment, shall prevent separation at joints, shall be manufacturer's standard type, and shall conform to the indicated specification.

2.1.1.2 Pipe Perforations

Water inlet area shall be a minimum of 0.5 square inch per linear foot. Manufacturer's standard perforated pipe which essentially meets these requirements may be substituted with prior approval of the Contracting Officer.

- a. Circular Perforations in Plastic Pipe: Circular holes shall be cleanly cut not more than 3/8 inch or less than 3/16 inch in diameter and arranged in rows parallel to the longitudinal axis of the pipe. Perforations shall be approximately 3 inches center-to-center along rows. The rows shall be approximately 1-1/2 inches apart and arranged in a staggered pattern so that all perforations lie at the midpoint between perforations in adjacent rows. The rows shall be spaced over not more than 155 degrees of circumference. The spigot or tongue end of the pipe shall not be perforated for a length equal to the depth of the socket, and perforations shall continue at uniform spacing over the entire length of the pipe.
- b. Slotted Perforations in Plastic Pipe: Circumferential slots shall be cleanly cut so as not to restrict the inflow of water and uniformly spaced along the length and circumference of the tubing. Width of slots shall not exceed 1/8 inch nor be less than 1/32 inch. The length of individual slots shall not exceed 1-1/4 inches on 3 inch diameter tubing, or 10 percent of the tubing inside nominal circumference on 4 to 8 inch diameter tubing. Rows of slots shall be symmetrically spaced so that they are fully contained in 2 quadrants of the pipe. Slots shall be centered in the valleys of the corrugations of profile wall pipe.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPE FOR SUBDRAINS

3.1.1 Installation of Pipe for Subdrains

3.1.1.1 Pipelaying

Each pipe shall be carefully inspected before it is laid. Any defective or

damaged pipe shall be rejected. No pipe shall be laid when the trench conditions or weather is unsuitable for such work. Water shall be removed from trenches by sump pumping or other approved methods. The pipe shall be laid to the grades and alignment as indicated. The pipe shall be bedded to the established gradeline. Perforations shall be centered on the bottom of the pipe. Pipes of either the bell-and-spigot type or the tongue-and-groove type shall be laid with the bell or groove ends upstream. All pipes in place shall be approved before backfilling.

3.1.1.2 Jointings

- a. Perforated and solid corrugated polyethylene drainage pipe shall be installed in accordance with the manufacturer's specifications and as specified herein. A pipe with physical imperfections shall not be installed. No more than 5 percent stretch in a section will be permitted.

3.2 INSTALLATION OF FILTER MATERIAL AND BACKFILLING FOR SUBDRAINS

After pipe for subdrains has been laid, inspected, and approved, filter material shall be placed around and over the pipe to the depth indicated. The filter material shall be placed in layers not to exceed 8 inches thick. Compaction of filter material and the placement and compaction of overlying backfill material shall be as indicated.

-- End of Section --

SECTION 02742N

PAVEMENT WITH A BITUMINOUS CONCRETE SURFACE
09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 1557	(2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 2950	(1991; R 1997) Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D 4253	(2000) Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D 4254	(2000) Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density

MARYLAND STATE HIGHWAY ADMINISTRATION (MD SHA)

MD SHA CM	(2001) Standard Specifications for Construction and Materials
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1.2 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0 of the basic contract.

SD-06 Test Reports

Subbase material density
Subbase Course
Bituminous Concrete Courses Test

SD-07 Certificates

Subbase materials
Tack coat
Bituminous concrete mix

1.3 DESCRIPTION

This section includes a provision for the construction upon a prepared subgrade surface, subbase, bituminous concrete binder (base) course, bituminous concrete wearing (surface) course, and curbing. Work shall be performed in accordance with the applicable requirements of the MD SHA CM specifications, except that the contractual and payment provisions do not apply. Articles and sections listed herein refer to these specifications. Where the term "Engineer" is used, it will equate to "Contracting Officer"; where the term "Administration" is used, it will equate to the "Federal Government" or "Government."

1.4 DEFINITION OF TERMS

1.4.1 Subgrade

An existing or borrow earth foundation upon which the pavement is constructed.

1.4.2 Subbase

A graded aggregate material having greater stability than the underlying subgrade material, used to reduce the thickness requirements of the bituminous concrete pavement section.

1.4.3 Bituminous Concrete Binder Course

A bituminous concrete layer immediately below the bituminous concrete wearing course. It is referred to as a base course in the specified reference documents.

1.4.4 Bituminous Concrete Wearing Course

The top traffic-bearing layer of pavement. It is referred to as a surface course in the specified reference documents.

1.4.5 Tack Coat

A light application of bituminous material applied to an existing bituminous surface, or the vertical cut surfaces of an existing pavement section to ensure bonding between the surfaces being paved and the new bituminous concrete material.

PART 2 PRODUCTS

2.1 SUBBASE MATERIALS

MD SHA CM Section 901, Table 901A, Crusher Run Aggregate CR-6.

2.2 BITUMINOUS CONCRETE BINDER (BASE) COURSE MATERIALS

MD SHA CM Section 901, Table 901C BF or current approved MD SHA CM equivalent subject to approval of the Contracting Officer. MD SHA CM Section 904.

2.3 BITUMINOUS CONCRETE WEARING (SURFACE) COURSE MATERIALS

MD SHA CM Section 901, Table 901C SF or current approved MD SHA CM

equivalent subject to approval of the Contracting Officer. MD SHA CM Section 904.

2.4 TACK COAT MATERIALS

MD SHA CM Section 904.05, emulsified asphalt.

2.5 BITUMINOUS CONCRETE CURBING MATERIALS

MD SHA CM Section 901, Table 901C SF or current approved MD SHA CM equivalent subject to approval of the Contracting Officer. MD SHA CM Section 904.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

Prepare subgrade in accordance with Section 02315N, "Excavation and Fill."

3.2 SUBBASE CONSTRUCTION

Construct in accordance with MD SHA CM Section 501.03. Subbase material density shall be compacted to 97 percent of ASTM D 1557 or 70 percent relative density in accordance with ASTM D 4253 and ASTM D 4254.

Place woven geotextile in a loose and unstretched condition. Overlap edges a minimum of 12 inches.

3.3 BITUMINOUS CONCRETE BINDER (BASE) COURSE CONSTRUCTION

MD SHA CM Section 504.

3.4 BITUMINOUS CONCRETE WEARING (SURFACE) COURSE CONSTRUCTION

MD SHA CM Section 504.

3.5 TACK COAT APPLICATION

MD SHA CM Section 504.03.04. Apply to the vertical cut surfaces of the pavement, to the top of the bituminous concrete binder (base) course, and to the surface of the area to receive curbing.

Clean and fill transverse joints between old and new pavement as directed by the Contracting Officer with tack coat material insuring that it fully penetrates and completely fills the joint. Remove excess tack coat material along the joint. Immediately cover with a light application of clean sand.

3.6 BITUMINOUS CONCRETE CURBING INSTALLATION

MD SHA CM Section 602.03.02 and as indicated.

3.7 JOINTS

Joints in successive courses shall be staggered a minimum of 6 inches so that one course is not above the other. Joints shall be constructed to provide a continuous bond between the old and new surfaces. The edge of the existing pavement, if single-layer construction, shall be saw cut back for its full depth to expose a fresh surface. The top layer of existing

pavement, if multi-layer construction, shall be milled and remaining layers saw cut back for their remaining depth to expose a fresh surface. All exposed bituminous concrete surfaces, including saw cut and milled surfaces, shall be coated with tack coat.

3.8 HEELING-IN

Where tapering of the material from specified thickness is required to tie in with the existing bituminous concrete pavement, heeling-in to the existing pavement is required. Heeling-in shall include the removal of a portion of the existing pavement.

3.9 GRADING

Finish grades as indicated within one-tenth of one-foot unless otherwise indicated or directed by the Contracting Officer. Grade pavement to provide positive drainage away from structures, provide positive drainage to surface water control features, and eliminate ponding of water.

3.10 FIELD TESTING

3.10.1 Subbase Course

3.10.1.1 Smoothness Tests

Correct deviations on the surface in excess of 3/8 inch when tested with a 10 foot straightedge applied parallel with and at right angles to the center line of the paved area by loosening, adding or removing material, reshaping, watering, and compacting. The smoothness requirements specified herein apply only to the top layer when the subbase is constructed in more than one layer.

3.10.1.2 Density Tests

ASTM D 2922, as follows: one test per 100 square yards, with a minimum of three tests.

3.10.1.3 Thickness Tests

Measure the thickness of the subbase at intervals such that there will be a depth measurement for at least each 100 square yards of a complete subbase course, with a minimum of three tests. Make a depth measurement with test holes at least 3 inches in diameter through the subbase course unless otherwise directed by the Contracting Officer. Where there is a deficiency greater than 1/2 inch, correct by scarifying, adding the mixture of proper gradation, reblading, and recompacting. Where the measured thickness is more than 1/2 inch thicker than indicated, consider it as the indicated thickness plus 1/2 inch for determining the average. The average thickness is the average of the depth measurements; the average thickness shall have a maximum underrun of the thickness indicated of 1/4 inch.

3.10.2 Bituminous Concrete Courses Test

3.10.2.1 Smoothness

Test the compacted surface of the bituminous concrete binder and wearing courses with a straightedge as the work progresses. Apply the straightedge parallel with and at right angles to the centerline after the final rolling. The evenness of the binder course shall have a maximum variance

of plus or minus 1/4 inch for every 10 feet. The maximum variance in the wearing course shall be plus or minus 1/8 inch for every 10 feet. Correct any portion of the pavement showing irregularities greater than those specified.

3.10.2.2 Density

One field test for each 100 square yards of bituminous concrete binder course and wearing course, with a minimum of three tests each course, in accordance with ASTM D 2950. Thin layer nuclear density gauge readings shall be taken on a control strip to determine the number of coverages to obtain optimum density. Optimum density is defined when the average density does not change by more than 1.0 percent between successive coverages.

3.10.2.3 Thickness

The maximum allowable deficiency at any point shall be 1/4 inch less than the indicated thickness for any course. The minimum average thickness of the course shall be equal to the indicated thickness. Where the deficiency exceeds the specified tolerances, the Contractor shall correct such area or areas by removing the pavement in question and replacing with new pavement.

-- End of Section --

SECTION 02953

TREES, SHRUBS, PLANTS, AND GRASS
09/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z60.1 (1996) Nursery Stock

U.S. DEPARTMENT OF AGRICULTURE (USDA)

USDA FSA (January 1985) Federal Seed Act Rules and Regulations of the Secretary of Agriculture

USDA SCS List (1982) Soil Conservation Service, National List of Scientific Plant Names, (Volume 1-List of Plant Names), Report Number SCS-TP-159

U.S. DEPARTMENT OF INTERIOR (DOI)

DOI List (1988) National List of Plants Species that Occur in Wetlands: National Summary, Biological Report 88(24), Fish and Wildlife Service

MARYLAND STATE HIGHWAY ADMINISTRATION (MD SHA)

MD SHA CM (2001) Standard Specifications for Construction and Materials

MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE)

MDE SESC (1994) Standards and Specifications for Soil Erosion and Sediment Control

1.2 DEFINITION

1.2.1 Stand of Turf

95 percent ground cover of the established species.

1.2.2 Restoration Areas

Refers to all areas designated for establishment of indigenous vegetation as indicated.

1.3 SUBMITTALS

Submit the following in accordance with Section C of the basic contract.

SD-06 Test Reports

Erosion control materials

Topsoil

SD-07 Certificates

Wetland seed mixture

Nursery certifications

Indicate names of plants in accordance with the DOI List or USDA SCS List, including type, quality, and size.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Arrange for delivery of plant material as close as possible to planting. Small deliveries of only that plant material which can be installed the same day are recommended.

1.4.1.1 Seed Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.4.1.2 Branched Plant Delivery

Deliver with branches tied and exposed branches covered with material which allows air circulation. Prevent damage to root balls and desiccation of leaves.

1.4.1.3 Fertilizer and Lime Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and Federal laws. Fertilizer and lime may be furnished in bulk with a certificate indicating the above information.

1.4.1.4 Plant Labels

Deliver plants with durable waterproof labels in weather-resistant ink. Provide labels stating the correct plant name and size as specified in the list of required plants. Attach to plants, bundles, and containers of plants. Groups of plants may be labeled by tagging one plant. Labels shall be legible for a minimum of 60 days after delivery to the planting site.

1.4.2 Storage

1.4.2.1 Plant Storage and Protection

Store and protect plants not planted on the day of arrival at the site as

follows:

- a. Shade and protect plants in outside storage areas from the wind and direct sunlight until planted.
- b. Heel-in bare root plants.
- c. Protect balled and burlapped plants from freezing or drying out by covering the balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering which allows air circulation.
- d. Keep plants in a moist condition until planted by watering with a fine mist spray.

1.4.2.2 Lime, Fertilizer, and Mulch Storage

Store in dry locations away from contaminants.

1.4.2.3 Antidesiccants Storage

Do not store with other landscape materials.

1.4.2.4 Seed, Fertilizer and Lime Storage

Store in cool, dry locations away from contaminants.

1.4.2.5 Topsoil

Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

1.4.3 Handling

Do not drop or dump materials from vehicles. Avoid damaging plants being moved from nursery or storage area to planting site. Handle balled and burlapped plants carefully to avoid cracking or breaking the earth ball. Do not handle plants by the trunk or stem. Puddle bare-root plants after removal from the heeling-in bed to protect roots from drying out. Remove damaged plants from the site.

1.5 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.5.1 Planting Dates

Planting dates as indicated. Planting outside these time periods may be acceptable depending on specific conditions at the site. However, planting outside these periods shall be conducted only after the approval by the Contracting Officer.

1.5.2 Restrictions

Do not plant when ground is frozen, snow covered, or when air temperature exceeds 95 degrees F.

1.5.3 Seed

Apply seed within twenty four hours after seed bed preparation.

1.6 GUARANTEE

All plants shall be guaranteed for one year beginning on the dates of inspection by the Contracting Officer to commence the plant establishment period.

1.7 SUBSTITUTIONS

Authorization shall be obtained from the Contracting Officer before performing work in variance to these specifications including substitutions of plant material in terms of species, size, or form.

1.8 REQUIREMENTS FOR OFF SITE SOIL

Provide in accordance with Section 02315N, "Excavation and Fill."

PART 2 PRODUCTS

2.1 PLANTS

2.1.1 Varieties

Botanical names indicated are listed in DOI List or USDA SCS List. Furnish nursery stock in accordance with ANSI Z60.1, except as otherwise specified or indicated. Each plant or group of planting shall have a "key" number indicated on the nursery certifications of the plant schedule. Furnish plants grown under climatic conditions similar to those in the locality of the project. Spray plants budding into leaf or having soft growth with an antidesiccant before digging. Plants of the same specified size shall be of uniform size and character of growth.

2.1.2 Plant Regulations

ANSI Z60.1, and the following additional requirements.

2.1.2.1 Shape and Condition

Well-branched, well-formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and having a healthy, normal, and unbroken root system.

2.1.2.2 Source and Plant Material

All plant material shall be nursery-grown specifically for use in USDA Hardiness Zone 7a. Plant material collected from wild settings shall not be used.

2.1.2.3 Plant Material Used in the Restoration Areas

- a. Basket Willow (*Salix purpurea*)
- b. Silky Dogwood (*Cornus amomum*)
- c. Buttonbush (*Cephalanthus occidentalis*)
- d. Swamp Milkweed (*Asclepia incarnata*)
- e. Lake Sedge (*Carex lacustris*)
- f. Black Gum (*Nyssa sylvatica*)
- g. Mannagrass (*Glyceria septentrionalis*)
- h. New England Aster (*Aster novae-angliae*)
- i. Lizardtail (*Saururus cernuus*)
- j. Cardinal Flower (*Lobelia cardinalis*)

- k. Small Jack in the Pulpit (*Arisaema triphyllum*)
- l. Yellow Nutsedge (*Cyperus esculentus*)
- m. Soft Rush (*Juncus effusus*)
- n. Rice Cutgrass (*Leersia oryzoides*)
- o. Wool Grass (*Scirpus cyperinus*)
- p. Green Ash (*Fraxinus pennsylvanicum*)
- q. Tussock Sedge (*Carex stricta*)
- r. Willow Oak (*Quercus phellos*)
- s. Sweet Pepperbush (*Clethra alnifolia*)
- t. Elderberry (*Sambucus canadensis*)
- u. Sweetgum (*Liquidambar styraciflua*)
- v. Smooth Alder (*Alnus serrulata*)
- w. Fetterbush (*Leucothoe ramosa*)
- x. Black Willow (*Salix nigra*)

2.1.2.4 Size

Minimum sizes shall be those available from the nursery stock, based on the average width or height of the plant for the species as specified in ANSI Z60.1.

2.1.3 Plant Material Standards

All plant material shall meet applicable standards set in ANSI Z60.1.

2.1.3.1 Bareroot Herbaceous Material

Display new roots that are clean and white in coloration, and the plants shall appear healthy with no significant foliage spots, discolorations, wilting, or other evidence of disease or insect damage.

2.1.3.2 Bareroot Trees and Shrubs

Show good form; be sound and vigorous; be free of disease and insect damage, sunscald, windburn, and abrasion; and have a well-developed fibrous root system. Have an abundance of well-developed terminal buds on the leaders and branches, and the stems and branches shall be turgid and have a healthy cambium. Plants shall not be leafed out at the time of delivery.

a. Container Grown Trees and Shrubs

- (1) The root system shall be well distributed throughout the container, but not potbound.

b. Balled and Burlapped Trees and Shrubs

- (1) Balls shall be firm natural soil meeting the size criteria in ANSI Z60.1. Balls shall be securely tied using burlap or other strong, biodegradable cloth.

2.1.3.3 Rhizomes

Be firm and of normal coloration and size.

2.2 TOPSOIL

Test for USDA classification, organic content, pH, soluble salts, nitrogen, phosphorous, and potassium by a recognized commercial laboratory.

2.2.1 Existing Topsoil

Modify existing soil to conform to the requirements specified in paragraph entitled "Topsoil Composition." Do not use soils from areas where the invasive species Phragmites (*Phragmites australis*) is known to occur.

2.2.2 Off-Site Topsoil

Conform to requirements specified in paragraph entitled "Topsoil Composition." Additional topsoil shall be furnished by the Contractor. Do not use soils from areas where invasive species Phragmites (*Phragmites australis*) is known to occur.

2.2.3 Topsoil Composition

Soil for use in the upper 6 inches of the wetland and site restoration areas shall be of medium texture (loam, sandy loam, loamy sand, or silt loam); contain a minimum of 1.5 percent organic matter; have pH between 6.0 and 7.0; and soluble salts less than or equal to 500 ppm.

2.3 pH ADJUSTERS

2.3.1 Lime

As indicated.

2.4 FERTILIZER

Requirements for temporary and permanent seeding as indicated.

2.5 SOIL CONDITIONERS

MDE SESC, Section 21 for permissible soil conditioners or as otherwise specified.

2.6 SURFACE TOPDRESSING

Mulches as indicated.

2.7 SEEDS

2.7.1 Classification

Provide State-certified seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weed and seed content, and inert material. Label in conformance with USDA FSA and MDE SESC. Wet, moldy, or otherwise damaged seed will be rejected. Field mixes will be acceptable when field mixing is performed on site in the presence of the Contracting Officer.

2.7.2 Composition

MDE SESC Section 20 or as otherwise specified.

2.7.3 Seed Mixture

2.7.3.1 Permanent Seed Mixture

- a. Perennial Ryegrass (*Lolium perenne*)
- b. Flatpea (*Lathyrus sylvestris*)

2.7.3.2 Temporary Seed Mixture

- a. Annual Ryegrass (*Loium multiflorum*)

2.7.3.3 Wetland Seed Mixture

Provide wetland seed mixture from a commercial supplier with the indicator status as defined in DOI List meeting the following:

- a. Include at least one obligate wetland (OBL) or facultative wetland (FACW) grass species, at least one OBL or FACW sedge species (*Carex sp.*), at least one OBL or FACW rush species (*Juncus sp.* or *Scirpus sp.*), and at least one OBL or FACW forb (broadleaved herb);
- b. Include no species designated as facultative upland (FACU) or upland (UPL);
- c. Include no species not originally indigenous to North America;
- d. Include no species generally considered to be invasive, including (but not necessarily limited to) phragmites (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), cattail species (*Typha sp.*), or tall fescue (*Festuca arundinacea*); and
- e. Apply 150 percent the recommended application rate to provide erosion and sedimentation control for seeded area.

2.8 FERTILIZERS

All fertilizers proposed for use must be approved by the Contracting Officer prior to application.

2.9 STREAM MATERIALS

2.9.1 Bank Run Gravel - Subbase

MD SHA CM, Section 901.01, Table 901A.

2.10 WATER

Suitable quality for irrigation.

2.11 MULCH

As indicated.

2.12 EROSION CONTROL MATERIALS

2.12.1 Matting for Erosion Control

MDE SESC, Section 22 and MD SHA CM, Section 920.06, Type B. Material shall contain ultraviolet (UV) inhibiting stabilizers to ensure endurance and provide permanent root reinforcement.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Extent of Work

Provide soil preparation, fertilizing, seeding, and topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas that are disturbed by the Contractor's operations.

3.1.2 Soil Preparation

Topsoil preparation in accordance with Section 02315N, "Excavation and Fill." Remove debris and stones larger than one inch in any dimension remaining on surface after tillage. Spread stockpiled topsoil evenly to provide positive drainage. Provide off-site topsoil to meet indicated finish grade. Do not spread topsoil when frozen or excessively wet or dry.

Correct irregularities in finished surfaces to eliminate depressions. Protect finished prepared topsoil areas from damage by vehicular or pedestrian traffic.

After areas have been brought to indicated finish grade, incorporate fertilizer, pH adjusters and topsoil conditioners as indicated by discing, harrowing, tilling or other method approved by the Contracting Officer. Remove debris and stones larger than one inch in any dimension remaining on the surface after tillage. Correct irregularities in finish surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.1.2.1 pH Adjuster Application Rates

Apply pH adjuster at rates as determined by laboratory soil analysis of the topsoil as indicated.

3.1.2.2 Soil Conditioner Application Rates

Apply topsoil conditioners at rates as determined by laboratory soil analysis of the topsoil as indicated.

3.1.2.3 Fertilizer Application Rates

Apply fertilizer at rates as determined by laboratory soil analysis of the topsoil as indicated.

3.2 SEEDING

3.2.1 Seed Application Seasons and Conditions

Immediately before seeding, restore topsoil to proper grade and thoroughly moisten topsoil. Do not seed when ground is muddy, frozen, snow covered or in an unsatisfactory condition for seeding. If special conditions exist

that may warrant a variance in the indicated seeding dates or conditions, submit a written request to the Contracting Officer stating the special conditions and proposed variance. Apply seed within twenty four hours after seedbed preparation. Sow seed by approved sowing equipment as indicated.

3.2.2 Seed Application Method

As indicated.

3.2.3 Surface Topdressing

For seeding methods other than hydroseeding, spread straw over seed bed area as indicated. Take precautionary measures to prevent topdressing materials from spilling onto pavements, utilities structures, or planter beds. Wood cellulose fiber mulch shall be utilized in conjunction with hydroseeding.

3.2.4 Rolling

Immediately after seeding, firm entire area except for slopes in excess of 3H to 1V with a roller not exceeding 90 pounds for each foot of roller width. If seeding is performed with cultipacker-type seeder or by hydroseeding, rolling may be eliminated.

3.2.5 Erosion Control Matting

Install in accordance with MDE SESC Section 22 and the manufacturer's instructions.

3.2.6 Watering

Start watering areas seeded as required by temperature and wind conditions. Apply water for duration and at a rate sufficient to insure topsoil is moist to a depth of 6 inches and topsoil surface is thoroughly wetted without run-off. During the germination process, seed is to be kept actively growing and not allowed to dry out.

3.3 PROTECTION OF TURF AREAS

Immediately after turfing, protect area against traffic and other use.

3.4 RESTORATION

Restore to original condition existing turf areas which have been damaged during turf installation operations.

3.4.1 Stream Bed Gravel

Provide as indicated.

3.5 MAINTENANCE

Maintenance shall begin immediately after planting. Seeded areas shall be protected and maintained until formal acceptance by the Contracting Officer. Maintenance shall consist of watering activities and other necessary operations adequate to insure the survival of the planted materials and seeded areas for the duration of the maintenance period, as specified in MDE SESC Section 20.

3.6 PREPARATION - RESTORATION AREA

3.6.1 Site Preparation

The areas designated for restoration shall be free of live herbaceous vegetation prior to planting. Any live herbaceous vegetation on the site at the time of planting shall be killed by a ground application of an herbicide. Killed herbaceous vegetation shall not be physically removed.

3.6.2 Layout

Approved plant material locations and bed outlines on the project site will be staked and flagged before digging plant pits or beds. The Contracting Officer reserves the right to adjust plant material locations to meet field conditions.

3.6.3 Transportation

Provide adequate protection, packaging and handling of all plant materials during their transportation to the site to guard against injury or desiccation. All plants injured and plants with root balls broken during planting operation will be rejected. All plant material is to be planted as soon as possible after its arrival on the site. All bare-root plants shall be planted or heeled-in immediately upon delivery to the site. All other plant material that can not be planted immediately upon delivery shall be covered with moist topsoil, mulch, or other material to provide protection from drying winds and sun. All plants shall be watered as necessary until planted.

3.6.4 Excavation, Topsoiling and Planting

Provide minimum of 6 inches of topsoil over the restoration areas or as otherwise indicated. Protect existing adjacent vegetation before excavations are made. Measure depth of pits from finished grade. Depth of excavation shall provide proper relation between top of ball and finished grade as specified in paragraph entitled "Handling."

3.6.5 Root Pruning

Cleanly prune any damaged roots from the bare root seedlings.

3.7 PLANTING

3.7.1 Planting Pits

3.7.1.1 Planting Pits for Bare Root Plants

Planting pits shall be excavated to a depth such that the root system will be just below grade, and to a width accommodating the root system in a natural position.

For rhizomes, no pit shall be excavated, but soil shall be loose and friable to depth that the rhizome may be planted and covered with one inch of soil.

3.7.1.2 Planting Pits for Balled and Burlapped and Container Grown Plants

Planting pits shall be excavated, to a depth that the top of the rootball

(removed from the container, if container grown) will sit approximately 1 to 2 inches above the surrounding grade, and to a width that will leave approximately 9 additional inches on each side of the rootball.

3.7.1.3 Planting Pits for Peat Pot Stock

Planting pits shall be excavated so that the top of the peat pot shall be between 1 and 2 inches below the topsoil surface.

3.7.2 Setting and Planting

3.7.2.1 Setting Bare Root Plants

Each plant shall be set vertically in its pit such that the uppermost roots are just below grade and that the extended root system does not touch the edge of the pit. All visible damaged roots shall be cleanly pruned above the area of damage prior to setting the plants.

3.7.2.2 Setting Balled and Burlapped and Container Grown Plants

The rootball shall be placed in the center of the pit and backfilled. Tree and shrubs shall not have more than a 10 percent lean following backfilling.

3.7.2.3 Setting Peat Pots

Peat pots shall be set so that the top of the peat pot is between 1 and 2 inches below the topsoil surface.

3.7.3 Backfilling and Tamping

3.7.3.1 Backfilling Bare Root Plants

Backfill shall comprise the soil originally removed from the pit, loose and without clods, but not amended. Backfill shall be loosely added to the pit so as to not crush or compress the roots. Once placed, the backfill shall be gently tamped to pack topsoil around the roots.

Rhizomes shall be gently pressed into loose and friable soil such that the rhizomes are covered by one inch of soil.

3.7.3.2 Backfilling Balled, Container Grown Plants and Peat Pots

Backfill shall be comprised of topsoil originally removed from the pit, loose and without clods, but not amended. Once placed, the backfill shall be gently tamped. Excess backfill shall be loosely raked across the land surface surrounding the pit, but not used to create a saucer to trap rainwater.

3.7.4 Watering

Topsoil around each plant shall be thoroughly watered immediately following planting.

3.7.5 Mulching

After watering, a circular area 30 inches in diameter surrounding each tree shall be mulched to a depth of 2 inches.

3.7.6 Other

Newly graded areas outside of the limits of the wetland restoration areas shall be topsoiled and seeded as indicated.

3.8 MAINTENANCE PERIOD

Maintenance shall begin immediately after planting and shall be provided for either the replicated new trees, shrubs and grasses. New planting and seeded areas shall be protected and maintained for a period of ten (10) weeks after formal acceptance by the Contracting Officer. Maintenance shall consist of watering activities and other necessary operations adequate to insure the survival of the planted materials and seeded areas for the duration of the maintenance period. Remove and replace all dead plants.

-- End of Section --

SECTION 10401

SIGNAGE
02/99

PART 1 GENERAL

1.1 REFERENCES

The publication listed below form a part of this specification to the extent referenced. The publications is referred to within the text by the basic designation only.

MARYLAND STATE HIGHWAY ADMINISTRATION (MD SHA)

MD SHA CM

(2001) Standard Specifications for
Construction and Materials

PART 2 PRODUCTS

2.1 SIGNS

2.1.1 Material

MD SHA CM, Section 813.02, sheet aluminum sign panel.

2.1.2 Sign Finish

As indicated.

2.2 POST

MD SHA CM, Section 802.02, U-type post, galvanized steel. Post shall be 1.33 pounds per foot.

2.2.1 Bolts

As indicated.

PART 3 EXECUTION

3.1 INSTALLATION

Install signs at locations as indicated. Ensure that signs are installed plumb and true, at mounting heights indicated.

-- End of Section --

SECTION 16050N

BASIC ELECTRICAL MATERIALS AND METHODS
08/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2002) National Electrical Safety Code

IEEE Std 100 (2000) IEEE Standard Dictionary of
Electrical and Electronics Terms

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2005) National Electrical Code

1.2 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.
- b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.
- c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.3 ADDITIONAL SUBMITTALS INFORMATION

Submittals required in other sections that refer to this section must conform to the following additional requirements as applicable.

1.3.1 Shop Drawings (SD-02)

Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.3.2 Product Data (SD-03)

Submittal shall include performance and characteristic curves.

1.4 QUALITY ASSURANCE

1.4.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.4.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.4.2.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.2.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.5 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.6 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

- a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

- b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.
- c. Safety precautions.
- d. The procedure in the event of equipment failure.
- e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.7 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.8 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION 16302N

UNDERGROUND TRANSMISSION AND DISTRIBUTION
02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C2 (1997) National Electrical Safety Code

ASTM INTERNATIONAL (ASTM)

ASTM F 512 (1995; R 2001e1) Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS (2003) Acceptance Testing Specifications

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA RN 1 (1998) Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

NEMA TC 3 (2004) Polyvinyl Chloride PVC Fittings for Use with Rigid PVC Conduit and Tubing

NEMA TC 8 (1990) Extra-Strength PVC Plastic Utilities Duct for Underground Installation

NEMA TC 9 (2004) Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2005) National Electrical Code

NFPA 70B (2002) Electrical Equipment Maintenance

UNDERWRITERS LABORATORIES (UL)

UL 486A (1997; Rev thru May 2001) Wire Connectors and Soldering Lugs for Use with Copper Conductors

UL 514B (2004) Conduit, Tubing and Cable Fittings

UL 6 (2000; Rev thru May 2003) Rigid Metal

Conduit

UL 83

(2003; Rev thru Mar 2004)

Thermoplastic-Insulated Wires and Cables

1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS applies to this section with additions and modifications specified herein.

1.3 DEFINITIONS

- a. In the text of this section, the words conduit and duct are used interchangeably and have the same meaning.

1.4 SUBMITTALS

Submit the following in accordance with Section C of the basic contract.

SD-03 Product Data

600 volt wires and cables

SD-06 Test Reports

Acceptance checks and tests; G

Identify each cable for 600-volt, and medium voltage cable tests. When testing grounding electrodes and systems, identify each electrode and system for each test, as well as the resistance and soil conditions at the time the measurement were made.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Conduit

2.1.1.1 Rigid Metal Conduit

UL 6, galvanized steel, threaded type.

2.1.1.2 Rigid Metal Conduit, PVC Coated

UL 6, galvanized steel, threaded type, coated with a polyvinyl chloride (PVC) sheath bonded to the galvanized exterior surface, nominal 40 mils thick, conforming to NEMA RN 1, Type A40, except that hardness shall be nominal 85 Shore A durometer, dielectric strength shall be minimum 400 volts per mil at 60 Hz, tensile strength shall be minimum 3500 psi, and aging shall be minimum 1000 hours in an Atlas Weatherometer.

2.1.1.3 Plastic Utilities Duct for Concrete Encasement

NEMA TC 8, ASTM F 512, Type EB-35.

2.1.2 Fittings

2.1.2.1 Metal Fittings

UL 514B, threaded type.

2.1.2.2 PVC Conduit Fittings

NEMA TC 3 UL 514B.

2.1.2.3 PVC Duct Fittings

NEMA TC 9.

2.1.3 Conductors Rated 600 Volts and Less

Conductor and conduit sizes indicated are for copper conductors unless otherwise noted. Insulated conductors shall have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout the cable length. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.

2.1.3.1 600 Volt Wires and Cables

Conductors in conduit other than service entrance shall conform to UL 83, Type THWN. Conductor size and number of conductors in each cable shall be as indicated. Conductors shall be color coded. Conductor identification shall be provided within each enclosure where a tap, splice, or termination is made. Conductor identification shall be by color-coded insulated conductors, plastic-coated self-sticking printed markers, colored nylon cable ties and plates, or heat shrink type sleeves. Control circuit terminations shall be properly identified. All conductors shall be copper.

2.1.4 600 Volt Wire Connector and Terminals

Shall provide a uniform compression over the entire contact surface. Solderless terminal lugs shall be used on stranded conductors.

a. For use with copper conductors: UL 486A.

2.1.5 Pull Rope

Shall be plastic having a minimum tensile strength of 200 pounds. Leave a minimum of 24 inches of slack at each end of the pull wires.

PART 3 EXECUTION

3.1 INSTALLATION

NFPA 70 and ANSI C2.

3.1.1 Contractor Damage

The Contractor shall promptly repair any indicated utility lines or systems damaged by Contractor operations. Damage to lines or systems not indicated, which are caused by Contractor operations, shall be treated as "Changes" under the terms of the General Provisions of the contract. If the Contractor is advised in writing of the location of a nonindicated line

or system, such notice shall provide that portion of the line or system with "indicated" status in determining liability for damages. In any event, the Contractor shall immediately notify the Contracting Officer of any such damage.

3.1.2 Concrete

Shall be composed of fine aggregate, coarse aggregate, portland cement, and water so proportioned and mixed as to produce a plastic, workable mixture. Fine aggregate shall be of hard, dense, durable, clean, and uncoated sand. The coarse aggregate shall be reasonably well graded from 3/16 to one inch.

The fine and coarse aggregates shall be free from injurious amounts of dirt, vegetable matter, soft fragments or other deleterious substances. Water shall be fresh, clean, and free from salts, alkali, organic matter, and other impurities. Concrete shall have a compressive strength of 3000 psi at the age of 28 days. Slump shall not exceed 3 inches. Retempering of concrete will not be permitted. Exposed, unformed concrete surfaces shall be given a smooth, wood float finish. Concrete shall be cured for a period of not less than 7 days, and concrete made with high early strength portland cement shall be repaired by patching honeycombed or otherwise defective areas with cement mortar as directed by the Contracting Officer.

3.1.3 Underground Duct with Concrete Encasement

Construct underground duct lines of individual conduits encased in concrete. Except where rigid galvanized steel conduit is indicated or specified, the conduit shall be PVC Type EB-35. Do not mix different kinds of conduit in any one duct bank. Ducts shall not be smaller than 2 inches in diameter unless otherwise indicated. Concrete encasement surrounding the bank shall be rectangular in cross-section and shall provide at least 3 inches of concrete cover for ducts. Separate conduits by a minimum concrete thickness of 2 1/2 inches, except separate light and power conduits from control, signal, and telephone conduits by a minimum concrete thickness of 3 inches. Provide color, type and depth of warning tape as specified in Section 02315N EXCAVATION AND FILL.

3.1.3.1 Depth of Encasement

Top of the concrete encasement shall not be less than 18 inches below grade except that under roads and pavement concrete be a minimum of 24 inches below grade.

3.1.3.2 Slope of Encasement

Duct banks shall have a continuous slope downward toward underground structures and away from buildings with a minimum pitch of 3 inches in 100 feet. Except at conduit risers, accomplish changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, by long sweep bends having a minimum radius of curvature of 25 feet; sweep bends may be made up of one or more curved or straight sections or combinations thereof. Manufactured bends shall have a minimum radius of 18 inches for use with conduits of less than 3 inches in diameter. Excavate trenches along straight lines from structure to structure before ducts are laid or structure constructed so the elevation can be adjusted, if necessary, to avoid unseen obstruction.

3.1.3.3 Conduits

Stagger conduit joints by rows and layers to strengthen the duct bank.

Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in duct bank. Install spacers per manufacture's instructions, but provide a minimum of two spacer assemblies per 10 feet of duct bank. Before pouring concrete, anchor duct bank assemblies to prevent the assemblies from floating during concrete pouring. Anchoring shall be done by driving reinforcing rods adjacent to every other duct spacer assembly and attaching the rod to the spacer assembly.

3.1.3.4 Test Mandrel

As each section of a duct line is completed from structure to structure, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the diameter of the conduit through each conduit. After which, draw a stiff bristle brush through the conduit, until conduit is clear of particles of earth, sand, and gravel; then immediately install end plugs.

3.1.3.5 Conduit Plugs and Pull Rope

New conduit indicated as being unused or empty shall be provided with plugs on each end. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.

3.1.4 Underground Conduit for Service Feeders Into Buildings

Shall be galvanized rigid steel from the service equipment to a point 5 feet beyond the building and projections thereof. Protect the ends of the conduit by threaded metal caps or bushings; coat the threads with graphite grease or other coating. Clean and plug conduit until conductors are installed.

3.1.5 Conduit Protection at Concrete Penetrations

Galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations shall be PVC coated and shall extend from at least 2 inches within the concrete to the first coupling or fitting outside the concrete (minimum of 6 inches from penetration).

3.1.6 Buried Warning and Identification Tape

Section 02315N EXCAVATION AND FILL.

3.1.7 Cable Pulling

Pull cables down grade with the feed-in point at the manhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through manhole opening and into duct runs. Do not exceed the specified cable bending radii when installing cable under any conditions, including turnups into switches, transformers, switchgear, switchboards, and other enclosures. Cable with tape or wire shield shall have a bending radius not less than 12 times the overall diameter of the completed cable. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.

3.1.7.1 Cable Lubricants

Use lubricants that are specifically recommended by the cable manufacturer

for assisting in pulling jacketed cables. Lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings.

3.1.7.2 Cable Pulling Tensions

Tensions shall not exceed the maximum pulling tension recommended by the cable manufacturer.

3.1.8 Grounding Systems

3.1.8.1 Grounding Connections

Make grounding connections which are buried or otherwise normally inaccessible by exothermic weld.

- a. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.

3.1.9 Special Conditions

During the construction of duct banks and underground structures located in streets, the streets shall remain open to traffic. Plan and execute the work to meet this condition.

3.1.10 Earthwork for Utilities

Section 02315N EXCAVATION AND FILL.

3.1.11 Reconditioning of Surfaces

3.1.11.1 Unpaved Surfaces

Section 02953 TREES, SHRUBS, PLANTS, AND GRASS.

3.1.11.2 Paving Repairs

Where trenches, pits, or other excavations are made in existing roadways and other areas of pavement where surface treatment of any kind exists, restore such surface treatment or pavement the same thickness and in the same kind as previously existed, except as otherwise specified, and to match and tie into the adjacent and surrounding existing surfaces.

3.2 FIELD QUALITY CONTROL

As an exception to requirements that may be stated elsewhere in the contract, notify the Contracting Officer 5 working days prior to each test.

Furnish labor, equipment, and incidentals required for testing, except that the Government will provide electric power required for the tests. Correct defects in the work provided by the Contractor and repeat tests until the work is in compliance with contract requirements.

3.2.1 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations, NFPA 70B, NETA ATS, and referenced ANSI standards. Include the following visual and mechanical inspections and electrical tests, performed in accordance with

NETA ATS.

3.2.1.1 600 Volt Cable Tests

Perform tests after wiring is completed, connected, and ready for operation, but prior to placing system in service and before any branch circuit breaker is closed.

a. Visual and Mechanical Inspection

- (1) Inspect cables for physical damage and proper connection in accordance with contract plans and specifications.
- (2) Test cable mechanical connections to manufacturer's recommended values using a calibrated torque wrench. In the absence of manufacturer's data use NETA recommended values.
- (3) Check cable color coding for compliance with contract specifications.

b. Electrical Tests

- (1) Perform insulation-resistance test on each conductor with respect to ground and adjacent conductor; applied potential shall be 1000 volts DC for 1 minute; minimum insulation-resistance values shall not be less than 2 megohms.
- (2) Perform continuity test to insure proper cable connection.

-- End of Section --

SECTION 16402

INTERIOR DISTRIBUTION SYSTEM
08/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

- ASTM B 1 (2001) Hard-Drawn Copper Wire
- ASTM B 8 (2004) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

- EIA TIA/EIA-568-B.1 (2001; Addendum 2001) Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements (ANSI/TIA/EIA-568-B.1)
- EIA TIA/EIA-569-A (1998; Addenda 2000, 2001) Commercial Building Standards for Telecommunications Pathways and Spaces (ANSI/TIA/EIA-569-A)

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

- IEEE C2 (2002) National Electrical Safety Code
- IEEE Std 100 (2000) IEEE Standard Dictionary of Electrical and Electronics Terms

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- NEMA C80.1 (1994) Rigid Steel Conduit - Zinc Coated (GRC)
- NEMA RN 1 (1998) Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- NFPA 70 (2005) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

- UL 50 (1995; Rev thru Sep 2003) Enclosures for Electrical Equipment
- UL 514B (2004) Conduit, Tubing and Cable Fittings

UL 6	(2000; Rev thru May 2003) Rigid Metal Conduit
UL 83	(2003; Rev thru Mar 2004) Thermoplastic-Insulated Wires and Cables
UL 886	(1994; Rev thru Apr 1999) Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations

1.2 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.

1.3 SUBMITTALS

Submit the following in accordance with Section C of the basic contract.

SD-06 Test Reports

600-volt wiring test; G

1.4 QUALITY ASSURANCE

1.4.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.4.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.4.2.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.2.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Materials, equipment, and devices shall, as a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70.

2.2 CONDUIT AND FITTINGS

Shall conform to the following:

2.2.1 Rigid Metallic Conduit

2.2.1.1 Rigid, Threaded Zinc-Coated Steel Conduit

NEMA C80.1, UL 6.

2.2.2 Plastic-Coated Rigid Steel and IMC Conduit

NEMA RN 1, Type 40(40 mils thick).

2.2.3 Fittings for Metal Conduit, EMT, and Flexible Metal Conduit

UL 514B. Ferrous fittings shall be cadmium- or zinc-coated in accordance with UL 514B.

2.2.3.1 Fittings for Rigid Metal Conduit and IMC

Threaded-type. Split couplings unacceptable.

2.3 CABINETS, JUNCTION BOXES, AND PULL BOXES

Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel.

2.4 WIRES AND CABLES

Wires and cables shall meet applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Wires and cables manufactured more than 12 months prior to date of delivery to site shall not be used.

2.4.1 Conductors

Conductors No. 8 AWG and larger diameter shall be stranded. Conductors No. 10 AWG and smaller diameter shall be solid, except that conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3, shall be stranded unless specifically indicated otherwise. Conductor sizes and ampacities shown are based on copper, unless indicated otherwise. All conductors shall be copper.

2.4.1.1 Minimum Conductor Sizes

Minimum size for branch circuits shall be No. 12 AWG; for Class 1 remote-control and signal circuits, No. 14 AWG; for Class 2 low-energy, remote-control and signal circuits, No. 16 AWG; and for Class 3 low-energy, remote-control, alarm and signal circuits, No. 22 AWG.

2.4.2 Insulation

Unless specified or indicated otherwise or required by NFPA 70, power wires shall be 600-volt, Type THWN/THHN conforming to UL 83, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits shall be Type TW or TF, conforming to UL 83.

2.4.3 Bonding Conductors

ASTM B 1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B 8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

2.5 HAZARDOUS LOCATIONS

Electrical materials, equipment, and devices for installation in hazardous locations, as defined by NFPA 70, shall be specifically approved by Underwriters' Laboratories, Inc., or Factory Mutual for particular "Class," "Division," and "Group" of hazardous locations involved. Boundaries and classifications of hazardous locations shall be as indicated. Equipment in hazardous locations shall comply with UL 886 for outlet boxes and fittings.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations, including weatherproof and hazardous locations and ducts, plenums and other air-handling spaces, shall conform to requirements of NFPA 70 and IEEE C2 and to requirements specified herein.

3.1.1 Underground Service

Underground service conductors and associated conduit shall be continuous from service entrance equipment to outdoor power system connection.

3.1.2 Hazardous Locations

Work in hazardous locations, as defined by NFPA 70, shall be performed in strict accordance with NFPA 70 for particular "Class," "Division," and "Group" of hazardous locations involved. Provide conduit and cable seals where required by NFPA 70. Conduit shall have tapered threads.

3.1.3 Wiring Methods

Provide insulated conductors installed in rigid steel conduit except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways.

3.1.3.1 Pull Wire

Install pull wires in empty conduits. Pull wire shall be plastic having

minimum 200-pound force tensile strength. Leave minimum 36 inches of slack at each end of pull wire.

3.1.4 Conduit Installation

Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit will be visible after completion of project.

3.1.4.1 Conduit Support

Support conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Load applied to fasteners shall not exceed one-fourth proof test load. Fasteners attached to concrete ceiling shall be vibration resistant and shock-resistant. Holes cut to depth of more than 1 1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints shall not cut main reinforcing bars. Fill unused holes. In partitions of light steel construction, use sheet metal screws. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Conduit and box systems shall be supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts. Installation shall be coordinated with above-ceiling mechanical systems to assure maximum accessibility to all systems. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Where conduit crosses building expansion joints, provide suitable expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means.

3.1.4.2 Directional Changes in Conduit Runs

Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

3.1.4.3 Locknuts and Bushings

Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Locknuts shall have sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

3.1.4.4 Telecommunications and Signal System Pathway

Install telecommunications pathway in accordance with EIA TIA/EIA-569-A.

a. Horizontal Pathway: Telecommunications pathways from the work area to the telecommunications room shall be installed and cabling length requirements in accordance with EIA TIA/EIA-568-B.1.

b. Backbone Pathway: Telecommunication pathways from the telecommunications entrance facility to telecommunications rooms, and, telecommunications equipment rooms (backbone cabling) shall be installed in accordance with EIA TIA/EIA-569-A.

3.1.5 Boxes, Outlets, and Supports

Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways shall be cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces, or when installed in hazardous areas and when specifically indicated. Each box shall have volume required by NFPA 70 for number of conductors enclosed in box. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with outside of exterior surfaces. Fasten boxes and supports with wood screws on wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; support sheet metal boxes directly from building structure or by bar hangers. Where bar hangers are used, attach bar to raceways on opposite sides of box, and support raceway with approved-type fastener maximum 24 inches from box.

3.1.5.1 Pull Boxes

Construct of at least minimum size required by NFPA 70 except where cast-metal boxes are required in locations specified herein. Provide boxes with screw-fastened covers.

3.1.6 Repair of Existing Work

Repair of existing work shall be performed as follows:

3.1.6.1 Workmanship

Lay out work in advance. Exercise care where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces is necessary for proper installation, support, or anchorage of conduit, raceways, or other electrical work. Repair damage to buildings, piping, and equipment using skilled craftsmen of trades involved.

3.1.6.2 Existing Concealed Wiring to be Removed

Existing concealed wiring to be removed shall be disconnected from its source. Remove conductors; cut conduit flush with floor, underside of floor, and through walls; and seal openings.

3.1.6.3 Continuation of Service

Maintain continuity of existing circuits of equipment to remain. Existing circuits of equipment shall remain energized. Circuits which are to remain but were disturbed during demolition shall have circuits wiring and power restored back to original condition.

3.2 FIELD QUALITY CONTROL

Furnish test equipment and personnel and submit written copies of test results. Give Contracting Officer 5 working days notice prior to each test.

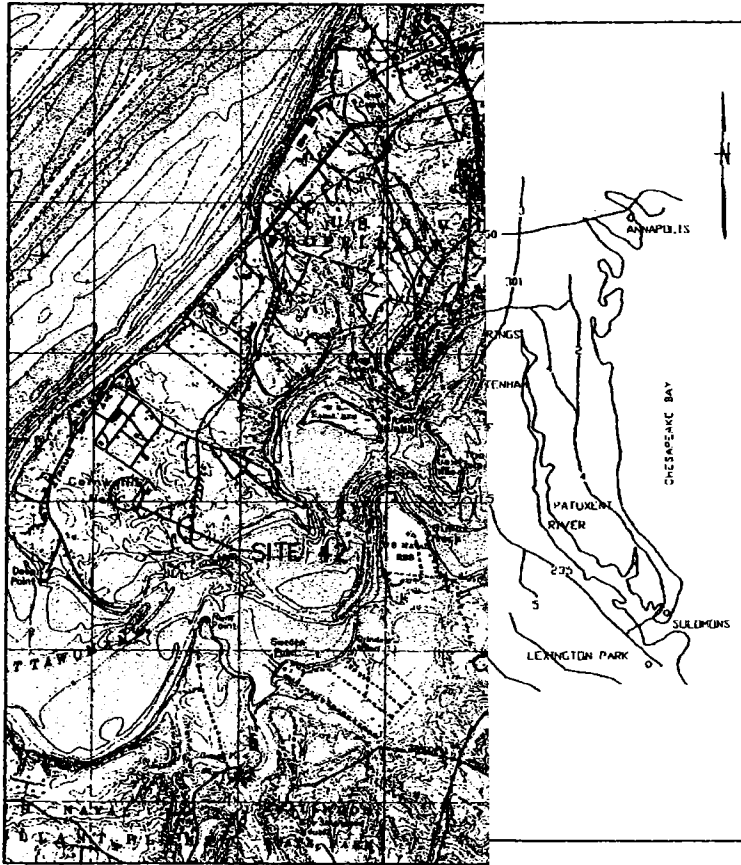
3.2.1 600-Volt Wiring Test

Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist.

-- End of Section --

Appendix C
Design Drawings

NA CONS



REFERENCE: INDIAN HEAD, MD-VA, SW14 INDIAN HEAD 15'

PROJECT LOCATION


NOT TO SCALE

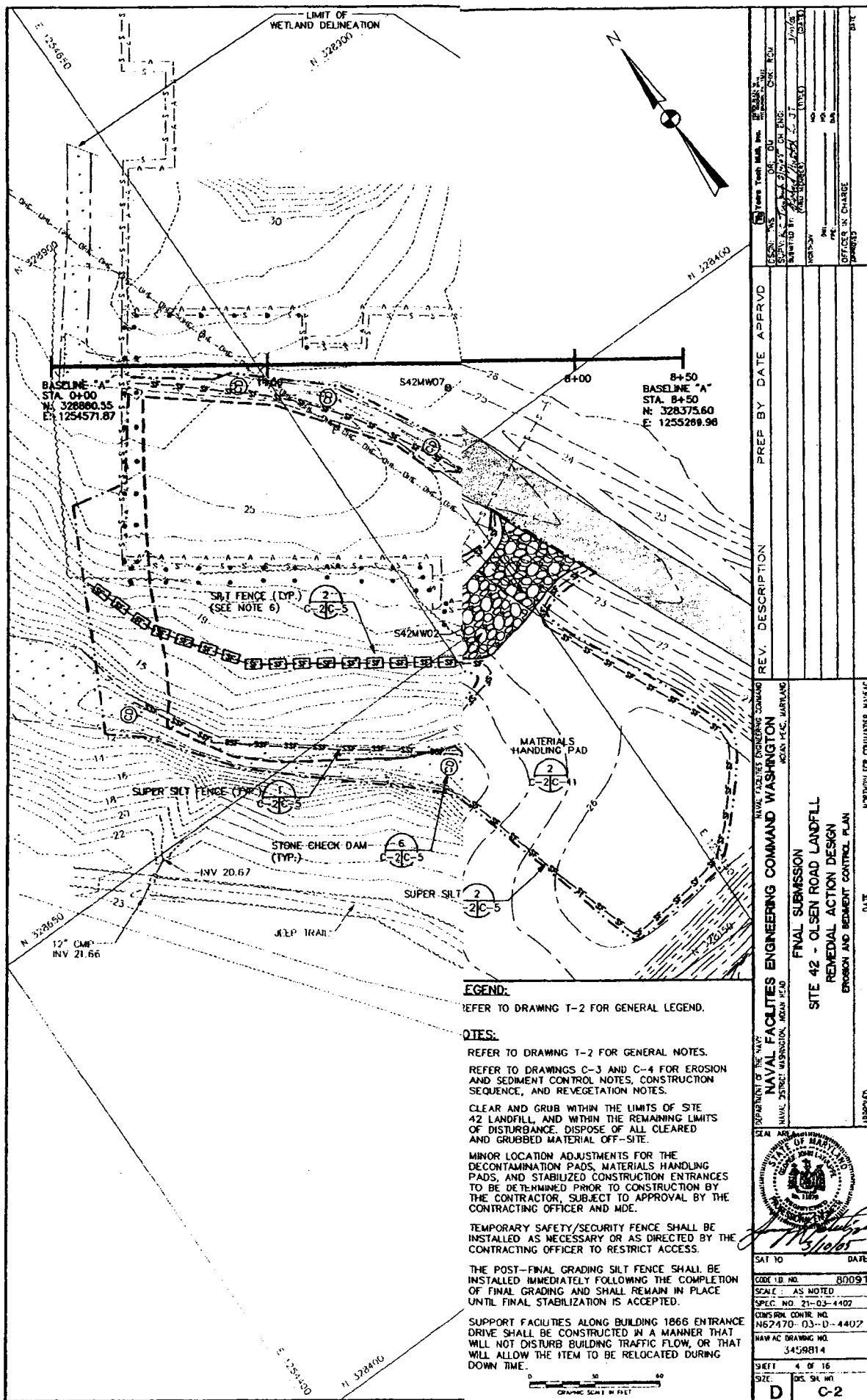
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL DISTRICT WASHINGTON, D.C. 20340		REV. DESCRIPTION PREP BY DATE APPROV		DESIGNED BY DRAWN BY CHECKED BY DATE	
FINAL SUBMISSION SITE 42 - OLSEN ROAD LANDFILL REMEDIAL ACTION DESIGN TITLE SHEET		REV. 1 DATE 11/11/03 BY [Signature] FOR [Signature]		DESIGNED BY [Signature] DRAWN BY [Signature] CHECKED BY [Signature] DATE 11/11/03	
APPROVED [Signature] DATE 11/11/03		OFFICER IN CHARGE [Signature]		DATE 11/11/03	

SEAL AREA 4 [Seal of the Department of the Navy]	
CODE ID NO. 80091	SHEET NO. 21 OF 402
CONFIRM COMMR NO. NS2470-03 D 4402	NAVFAC DRAWING NO. 3459811
SHEET D	T-1

GENERAL

1. GRID COORDINATES REFERENCE MARY
ZONE, NORTH AMERICAN DATUM, 1983
2. ELEVATIONS REFERENCE NATIONAL G
3. EXISTING TOPOGRAPHY AND FEATURE--STREAM STONE DIKE
RALEIGH, NORTH CAROLINA, MURPHY
1997, JANUARY 2002 AND MARCH 21
FROM BASEWIDE MAPPING PERFORMANCE
INC. OF INDIAN HEAD, MARYLAND. NO MATTRESS
4. ONE FOOT CONTOUR INTERVAL UNLESS
5. FIGURED DIMENSIONS TAKE PRECEDENCE
SCALE BEFORE SCALING DRAWINGS.
6. ALL WORK FOR THIS PROJECT SHALL ILLUSTRATE EMERGENT WETLAND
DRAWINGS AND SPECIFICATIONS. ALL
ALSO COMPLY WITH FEDERAL, STATE
7. THIS PROJECT REQUIRES GRADE-B ILLUSTRATE FORESTED WETLAND
ACCURACY. THE CONTRACTOR SHALL
NEW AND/OR ALTERED EXISTING ITEM
SEE SPECIFICATION SECTION 02224 -
POST-CONSTRUCTION LOCATION. ISLANDS
8. PRIOR TO COMMENCING WORK, ALLOW
TO ENSURE THAT ALL DEPARTMENT C
ARE COMPLIED WITH.
9. UTILITY LOCATIONS WERE OBTAINED F
BASEWIDE MAP. LOCATIONS SHOWN
UTILITY LOCATIONS PRIOR TO THIS BE
PASSIVE DETECTION METHODS (E.G. E
MAGNETIC LOCATORS, ACOUSTIC SURV
OFFICER.
10. THE CONTRACTOR SHALL THOROUGHLY
VERIFY EXISTING SITE CONDITIONS.
11. THE CONTRACTOR SHALL BE RESPONS
CONTROL FOR CONSTRUCTION. SEE C
12. THE CONTRACTOR SHALL STAKE THE
DISTURBED PRIOR TO ACTUAL WORK.
APPROVED BY THE CONTRACTING OFF
13. THE LOCATION(S) FOR CONTRACTOR S
CONTRACTING OFFICER AND THE MAR
(MDE) AND SHALL BE OUT OF THE W
ALL TO-BE-DETERMINED STAGING ARE
(I.E., MATERIAL PROCESSING AREA) SH
HAVE ONLY ONE POINT OF INGRESS/E
ENTRANCES, EROSION AND SEDIMENT
CONTRACTING OFFICER AND MDE.
14. THE SOLE POINT FOR INGRESS AND E
CONSTRUCTION ENTRANCE(S) WHICH V
APPROVED EROSION AND SEDIMENT C
15. THE CONTRACTOR SHALL PROVIDE INC
OF MOBILIZATION ACTIVITIES.
16. THE CONTRACTOR SHALL PROVIDE PRI
TO REMAIN IN SERVICE. THE CONTRA
REQUIRED BY THE CONTRACTOR TO PI
17. EXISTING GROUNDWATER MONITORING 1
BY EXCAVATION, GRADING, AND RESTI
ABANDONED. IN ADDITION GROUNDWA
OF AN UPGRADE AND WILL ALSO BE
ACCORDANCE WITH COMAR 26.04.04
S42MW12, AND S42MW13 AS INDICATE
18. THE CONTRACTOR SHALL BE RESPONS
PROJECT AREA WITHIN THE APPROVED
LIMITED AREA AT SITE 42, MATERIALS
A NOW-IN APPROVED MATERIAL PROC
19. THE CONTRACTOR SHALL MAINTAIN AL
MANNER APPROVED BY THE CONTRAC
20. ALL DISTURBED AREAS SHALL BE GRA
21. ALL DISTURBED AREAS INCLUDING CON
AREA SHALL BE STABILIZED USING AP
METHODS IMMEDIATELY UPON ESTABLIS
BE RESPONSIBLE FOR IMPLEMENTING A
THE APPROVED EROSION AND SEDIMEN
22. BUILDING 1866 AND NEARBY BUILDING
SHALL NOT BE INTERRUPTED. EXPLOS
CONSTRUCTION AND THE CONTRACTOR
THE CONTRACTOR MUST PROVIDE TO 1
AND MAY NOT PERFORM ANY WORK U
23. THE STEAMLINES, INCLUDING THE VERT
CONTAINS ASBESTOS. IT IS NOT THE II

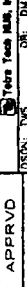
		DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL DISTRICT WASHINGTON, DISTRICT HEAD NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL ROAD, MARYLAND		REV. DESCRIPTION PREP BY DATE APPROV		U.S. Navy Test Mgmt. Div. 1000 20th St. NW WASHINGTON, D.C. 20540	
SAT 10		DATE		DESIGNED BY DRAWN BY CHECKED BY APPROVED BY SPECIAL IN CHARGE OFFICER IN CHARGE		DATE DATE DATE DATE DATE DATE	
COOR. ID. NO. 80091		SCALE: AS NOTED		SPEC. NO. 21-D3-4402		CONSTRUCTION NO. 21-D3-4402	
NAVFAC DRAWING NO. 3450812		SHEET 2 OF 16		SIZE:		DIS. 511 NO. T-2	



REVISIONS NO. DATE BY 1 10/10/03 JAC		PREP BY DATE APPROV JAC 10/10/03	
REV. DESCRIPTION 1. REVISED TO SHOW FINAL GRADING AND SEDIMENT CONTROL MEASURES.		DATE 10/10/03	
FINAL SUBMISSION SITE 42 - OLSEN ROAD LANDFILL REMEDIAL ACTION DESIGN EROSION AND SEDIMENT CONTROL PLAN		APPROVED [Signature] DATE 10/10/03	
NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL DISTRICT WASHINGTON, WASH DC 20380		NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL DISTRICT WASHINGTON, WASH DC 20380	
STATE OF MARYLAND DEPARTMENT OF THE NAVY NAVAL DISTRICT WASHINGTON, WASH DC 20380		STATE OF MARYLAND DEPARTMENT OF THE NAVY NAVAL DISTRICT WASHINGTON, WASH DC 20380	
CODE 101 NO. 80091 SCALE: AS NOTED SPEC. NO. 21-03-4402 COMPTON CONTR. NO. N62470-03-D-4402 NAVAC DRAWING NO. 3459814		SHEET 4 OF 16 SIZE: 4 1/2" x 11"	
D		C-2	

EROSION AND SEDIMENT CONTROL PLRDUCTION

- UNLESS OTHERWISE INDICATED, ALL VEGETATION AND STRUCTURAL EROSION AND
WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL TO ESTABLISH CONSTRUCTION
- THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER AND MARYLAND DEP.
(MDE) AT (410) 537-3510:
A. 7 DAYS PRIOR TO THE REQUIRED PRE-CONSTRUCTION MEETING.
B. FOLLOWING INSTALLATION OF EROSION AND SEDIMENT CONTROL DEVICES AND F
OF LAND DISTURBING ACTIVITIES.
C. 7 DAYS PRIOR TO FINAL INSPECTION.
- CONSTRUCT ALL EROSION AND SEDIMENT CONTROL MEASURES PER THE APPROVED
CONNECTION LINES, AND
THEM INSPECTED AND APPROVED BY THE CONTRACTING OFFICER AND MDE PRIOR TO THE LOCATIONS INDICATED
LAND DISTURBANCES. MINOR SEDIMENT CONTROL DEVICE LOCATION ADJUSTMENTS WILL BE FOLLOWED BY THE
WITH THE APPROVAL OF THE CONTRACTING OFFICER AND MDE, ENSURE THAT RIGID LINES SOUTH
AREAS IS DIRECTED TO THE SEDIMENT CONTROL DEVICES AND DO NOT REMOVE A
CONTROL MEASURE WITHOUT PRIOR APPROVAL FROM THE CONTRACTING OFFICER AND MDE
MUST OBTAIN PRIOR APPROVAL FROM THE CONTRACTING OFFICER AND MDE FOR ANY CHANGES TO THE SEQUENCE OF CONSTRUCTION.
INDICATED AND INSTALL NEW FIRE HYDRANT
AND FIRE HYDRANT CONSTRUCTION WAY
CTICAL LINES (BY OTHERS), HOWEVER
ITEM 6 MAY NOT OCCUR UNTIL ALL UTILITIES
AND THE REMOVAL OF THE EXISTING
BUILDING 1866 HAVE BEEN COMPLETED.
- FOLLOWING INITIAL SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY,
BE COMPLETED WITHIN 7 CALENDAR DAYS AS TO THE SURFACE OF ALL PERIMETER SLOPES, AND THE REMOVAL OF THE EXISTING
PERIMETER SLOPES, AND ALL SLOPES GREATER THAN 3 HORIZONTAL TO 1 VERTICAL
AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE.
- ALL INGRESS TO, AND EGRESS FROM THE SITE SHALL BE AT LOCATIONS PROTECTED BY CONSTRUCTION ENTRANCES.
N ENTRANCES, INSTALL THE
ALL REMAINING PERIMETER
FAMINATION PAD(S) AND EXCAVATION
FF-SITE MATERIAL PROCESSING AREA
- THE CONTRACTOR SHALL INSPECT DAILY AND MAINTAIN ALL EROSION AND SEDIMENTATION ARE SUBJECT TO
CONTINUOUSLY EFFECTIVE OPERATING CONDITION UNTIL SUCH TIME AS THEY ARE STABILIZED AND MUST BE APPROVED PRIOR
FROM THE CONTRACTING OFFICER AND MDE. SILT AND SUPER SILT FENCES SHALL BE MONITORED AND MUST BE APPROVED PRIOR
AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT FOR UNDERMINING OR DETEIORATED IN THE 1994 MARYLAND
SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION CAUSES AND SEDIMENT CONTROL
OF THE GEOTEXTILE HEIGHT. THE STABILIZED CONSTRUCTION ENTRANCES SHALL INCLUDE, BUT ARE NOT
AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT, ANY NECESSARY REPAIRS OF
EFFECTIVENESS OF THE EROSION AND SEDIMENT CONTROL DEVICES AND THE STATE
SHALL BE MADE IMMEDIATELY. SEDIMENT REMOVED FROM EROSION AND SEDIMENTATION OF ALL SUPPORT FACILITIES (I.E.
MANAGED AS INDICATED IN NOTE 8. RUCTION ENTRANCES, AND MATERIAL
- ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED EROSION AND SEDIMENT CONTROL CODES;
DURING LAND DISTURBANCE ACTIVITIES UNTIL FINAL STABILIZATION IS ACHIEVED.
EXCAVATIONS WILL BE COLLECTED AND TESTED TO DETERMINE THE APPROPRIATE MANAGEMENT DITCHES LOCATED ON THE
- IF DETERMINED APPROPRIATE, WATER RESULTING FROM EXCAVATION DEWATERING THROUGH AN APPROVED FILTRATION DEVICE PRIOR TO DISCHARGE. DECONTAMINATION BY THE CONTRACTING OFFICER AND MDE
CONTAINERIZED AND CHARACTERIZED PRIOR TO OFF-SITE DISPOSAL. SEDIMENT HANDLING BEST CONSTRUCTION PRACTICES.
AND SEDIMENT CONTROL DEVICES AND FROM WATER DURING EXCAVATION DEWATERING
ACTIVITIES PRIOR TO PLACEMENT OF THE 6-INCH COMMON FILL LAYER SHALL BE
SELECT LANDFILL MATERIAL LAYER. SEDIMENT REMOVED FROM THESE SOURCE MATERIALS STORAGE AND STAGING
THE INSTALLATION OF THE 6-INCH COMMON FILL LAYER SHALL BE MANAGED AS A, AND DECONTAMINATION PADS.
CONTRACTING OFFICER, AND STAGING AREAS, ACCESS
IRON PADS, STONE CHECK DAMS,
CONTRIBUTORY FENCE (AS NECESSARY).
- PRIOR TO REMOVAL OF EROSION AND SEDIMENT CONTROL MEASURES, THE CONTRACTOR SHALL ESTABLISH PERMANENT STABILIZATION FOR ALL CONTRIBUTORY DISTURBED AREAS
SEED MIXTURE INDICATED ON DRAWING C-4 WITH REQUIRED SOIL AMENDMENTS AND MULCH. AREAS BROUGHT TO FINISHED GRADE DURING THE SEEDING SEASON SHALL
AS SOON AS POSSIBLE, BUT NO LATER THAN 14 CALENDAR DAYS AFTER ESTABLISHMENT OF SEED MIXTURE. AREAS BROUGHT TO FINISHED GRADE DURING THE MONTHS OF NOVEMBER THROUGH FEBRUARY
STABILIZATION IS FOUND TO BE IMPRACTICAL, TEMPORARY SEED AND ANCHORED TO
DISTURBED AREAS. THE FINAL PERMANENT SEEDING AND ANCHOR MULCH OF ALL, TRANSPORT EXCAVATED
APPLIED BY MARCH 15 OR EARLIER IF GROUND AND WEATHER CONDITIONS ALLOWING SCREENING, TRANSPORT
AND MINUS MUNITIONS AND EXPLOSIVES OF
- THE SITE'S APPROVAL LETTER, APPROVED EROSION AND SEDIMENT CONTROL PLAN, STORAGE OR DISPOSAL FACILITY.
ALL EROSION AND SEDIMENT CONTROL FEATURES INSPECTIONS SHALL BE MAINTAINED
THE LOGS SHALL BE AVAILABLE AT THE SITE AT ALL TIMES FOR INSPECTION BY THE PROPOSED ENGINEER
AREA TO ESTABLISH THE INTERIM
- SURFACE DRAINAGE FLOWS OVER UNSTABILIZED CUT AND FILL SLOPES SHALL BE PREVENTED. DRILL MATERIAL SHALL BE
PREVENTING DRAINAGE FLOWS FROM TRAVERSING THE SLOPES OR BY INSTALLING PROTECTIVE METHODS, SUCH AS EROSION CONTROL DURING REGRADE AND PRIOR
MINIMIZE DOWNSLOPE EROSION. PROTECTIVE METHODS, SUCH AS EROSION CONTROL DURING REGRADE AND PRIOR
PROVIDED AT POINTS OF CONCENTRATED FLOW WHERE EROSION IS LIKELY TO OCCUR. SEDIMENT FROM THE EROSION
THE SELECT LANDFILL MATERIAL.
- TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES SHALL BE REMOVED, WITHIN FILL LAYER, ANY SEDIMENT
FOLLOWING APPROVAL OF PERMANENT STABILIZATION IN ALL CONTRIBUTORY DRAINAGE DEVICES SHALL BE STOCKPILED
BE RECEIVED FROM THE CONTRACTING OFFICER AND MDE.
- FOR FINISHED GRADING, THE CONTRACTOR SHALL PROVIDE ADEQUATE GRADIENTS PROTRUDING FROM THE PREPARED
STANDING ON THE SURFACE FOR MORE THAN 24 HOURS AFTER THE END OF A RAINFALL EVENT. FOLLOWING CONTRACTING OFFICER
DESIGNATED DRAINAGE COURSES AND CHANNEL FLOW AREAS WHICH MAY DRAIN ALL THE GRASS AND BITUMINOUS
AFTER THE END OF A RAINFALL EVENT, AREAS DESIGNED TO HAVE STANDING WATER SHALL BE CONSTRUCTED OF THE ENGINEERED
REQUIRED TO MEET THIS REQUIREMENT. ON WALLS AND RENO MATRESSES.
- THE CONTRACTING OFFICER AND MDE HAVE THE OPTION OF REQUIRING ADDITIONAL SILT FENCE, PLANT PERMANENT
CONTROL MEASURES IF DEEMED NECESSARY. RE INDICATED WETLANDS AND THE
OF THE SITE.
- VEGETATIVE STABILIZATION SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND INSTALL GROUNDWATER
FOR SOIL EROSION AND SEDIMENT CONTROL REFER TO APPROPRIATE SPECIFICATIONS AND INSTALL GROUNDWATER
PERMANENT SEEDING, MULCHING, AND GROUND COVER.
- OFF-SITE BORROW AREAS ON STATE OR FEDERAL PROPERTY MUST HAVE PRIOR APPROVAL FROM THE CONTRACTING OFFICER AND MDE. ALL OFF-SITE BORROW AREAS MUST BE PROTECTED BY SEDIMENTATION, ACCESS ROADS, DECONTAMINATION
AND REVEGETATE AS NEEDED. WHEN
HAVE BEEN ACCEPTED BY THE
- PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN THOSE INDICATED, REMOVE ALL REMAINING
BUT NOT LIMITED TO OFF-SITE BORROW AREAS AND THE MATERIAL PROCESSING AREA IMMEDIATELY STABILIZE ALL AREAS
SUBMIT A SUPPLEMENTAL EROSION CONTROL PLAN TO THE CONTRACTING OFFICER
FOR REVIEW AND CONCURRENCE. THE SUPPLEMENTAL PLAN IS NOT TO BE IMPLEMENTED
IS RECEIVED FROM THE CONTRACTING OFFICER AND MDE.
- SILT FENCE SHALL BE INSTALLED WHERE INDICATED PRIOR TO THE BEGINNING OF FINAL GRADES ARE ACHIEVED. ADDITIONAL SILT FENCE WILL BE INSTALLED. THE
SILT FENCE ALONG WITH THE ORIGINAL SILT FENCE WILL REMAIN IN PLACE UNTIL THE
ESTABLISHED. ADDITIONAL VEGETATION WILL BE PLANTED AS THE SILT FENCE IS
TIFICATION:
- STONE CHECK DAMS WILL BE INSTALLED WHERE INDICATED PRIOR TO BEGINNING OF FINAL GRADES ARE ACHIEVED. ADDITIONAL STONE CHECK DAMS WILL BE INSTALLED WITHIN THE STREAM TO REDUCE FLOOD VE
IN ADDITION, AS EXCAVATION PROCEEDS IN THE UNMAINED STREAM SOUTH AND SC
STONE CHECK DAMS WILL BE INSTALLED WITHIN THE STREAM TO REDUCE FLOOD VE
DAMS ALONG WITH THE ORIGINAL STONE CHECK DAMS WILL REMAIN IN PLACE UNTIL
WHERE STONE CHECK DAMS ARE CONSTRUCTED MUST BE STABILIZED IMMEDIATELY
CHECK DAM

		DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON 4041 REED MARLAND	
SEAL AIR		REV. DESCRIPTION	
SAT TO DATE		PREP BY DATE APPROV	
INDEX ID NO 80091 SCALE AS NOTED SPEC. NO. 21-03-4402 CONSTRUCTION NO. 162470-03-D-4402 NAVALC DRAWING NO. 3459815		REVISIONS NO. DATE 1 1/2/70 2 1/2/70 3 1/2/70 4 1/2/70 5 1/2/70 6 1/2/70 7 1/2/70 8 1/2/70 9 1/2/70 10 1/2/70 11 1/2/70 12 1/2/70 13 1/2/70 14 1/2/70 15 1/2/70 16 1/2/70 17 1/2/70 18 1/2/70 19 1/2/70 20 1/2/70 21 1/2/70 22 1/2/70 23 1/2/70 24 1/2/70 25 1/2/70 26 1/2/70 27 1/2/70 28 1/2/70 29 1/2/70 30 1/2/70 31 1/2/70 32 1/2/70 33 1/2/70 34 1/2/70 35 1/2/70 36 1/2/70 37 1/2/70 38 1/2/70 39 1/2/70 40 1/2/70 41 1/2/70 42 1/2/70 43 1/2/70 44 1/2/70 45 1/2/70 46 1/2/70 47 1/2/70 48 1/2/70 49 1/2/70 50 1/2/70 51 1/2/70 52 1/2/70 53 1/2/70 54 1/2/70 55 1/2/70 56 1/2/70 57 1/2/70 58 1/2/70 59 1/2/70 60 1/2/70 61 1/2/70 62 1/2/70 63 1/2/70 64 1/2/70 65 1/2/70 66 1/2/70 67 1/2/70 68 1/2/70 69 1/2/70 70 1/2/70 71 1/2/70 72 1/2/70 73 1/2/70 74 1/2/70 75 1/2/70 76 1/2/70 77 1/2/70 78 1/2/70 79 1/2/70 80 1/2/70 81 1/2/70 82 1/2/70 83 1/2/70 84 1/2/70 85 1/2/70 86 1/2/70 87 1/2/70 88 1/2/70 89 1/2/70 90 1/2/70 91 1/2/70 92 1/2/70 93 1/2/70 94 1/2/70 95 1/2/70 96 1/2/70 97 1/2/70 98 1/2/70 99 1/2/70 100 1/2/70	
SHEET 5 OF 16 SIZE C-3		OFFICER IN CHARGE DATE	

A. SITE PREPARATION

- | | | |
|--|--|--|
| III. LIME MATERIALS SHALL BE GROUND AGRICULTURAL LIMESTONE (HYDRATE LIME MAY BE SUBSTITUTED WHICH CONTAINS AT LEAST 5% TOTAL OXIDE PLUS AMMONIA OXIDE). LIMESTONE SHALL BE GROUND TO SUCH THAT AT LEAST 50% WILL PASS THROUGH A #100 MESH SIEVE, AND 98% WILL PASS THROUGH A #20 MESH SIEVE. | FERTILIZER

RATE

(10-10-10) | LIME RATE |
| IV. INCORPORATE LIME AND FERTILIZER INTO THE TOP 3 TO 5 INCHES OF STHS DISKING OR OTHER SUITABLE MEANS. REFER TO 1994 MARYLAND STAND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, SECTION 21/2 | JING
STHS | |
| C. SEEDBED PREPARATION | HES | 600 lbs/ac
(15 lbs/1000 sf)

4000 lbs/ac
(100 lbs/1000 sf) |

- I. TEMPORARY SEEDING
- SEEDBED PREPARATION SHALL CONSIST OF LOOSENING SOIL TO A DEPTH OF 3 TO 5 INCHES BY MEANS OF SUITABLE AGRICULTURAL OR CONSTRUCTION EQUIPMENT, SUCH AS DISC HARROWS, CHISEL PLOWS, OR RIPPERS. THE PERCENT N, P₂O₅, AND K₂O CAN BE ADJUSTED TO THE REQUIRED PERCENT N, P₂O₅, AND K₂O. AFTER THE SOIL IS LOOSENEED, IT SHOULD NOT BE ROLLED OR DRAGGED SMOOTH. IN THE ROUGHENED CONDITION, SLOPED AREAS (GREATER THAN 3% SLOPE) SHOULD BE TRACKED LEAVING THE SURFACE IN AN IRREGULAR CONDITION WITH RIDGES RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE.
 - APPLY SOIL AMENDMENTS AS PER SOIL TEST OR AS PRESCRIBED IN THE SEEDING SUMMARY.
 - INCORPORATE LIME AND FERTILIZER INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISKING OR OTHER SUITABLE MEANS.
- II. PERMANENT SEEDING
- MINIMUM SOIL CONDITIONS REQUIRED FOR PERMANENT VEGETATION ESTABLISHMENT: COVER FOR A MINIMUM PERIOD OF 1 YEAR WITH LIVING LOW MAINTENANCE.


- | | | DING SUMMARY | |
|----|---|--|----------|
| 1. | SOIL pH SHALL BE BETWEEN 6.0 AND 7.0. | | |
| 2. | SOLUBLE SALTS SHALL BE LESS THAN 500 PARTS PER MILLION (PPM). | | |
| 3. | TOPSOIL SHALL CONTAIN A MINIMUM OF 1.5% ORGANIC MATTER BY WEIGHT. | | |
| 4. | SOIL MUST CONTAIN SUFFICIENT PORE SPACE TO PERMIT ADEQUATE ROOT PENETRATION. | DING THIS | |
| 5. | IF THESE CONDITIONS CANNOT BE MET BY SOILS ON HAND, ADDING TOPSOIL IS REQUIRED IN ACCORDANCE WITH THE 21.0 STANDARD AND SPECIFICATIONS FOR TOPSOIL 1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL. | 1/2 IES | |
| b. | AREAS PREVIOUSLY GRADED IN CONFORMANCE WITH THE DRAINAGE SHALL BE MAINTAINED IN A TRUE AND EVEN GRADE, THEN SCORING OR OTHERWISE LOOSENESED TO A DEPTH OF 3 TO 5 INCHES TO PREVENT BONDING OF THE TOPSOIL TO THE SURFACE AREA AND TO PREVENT HORIZONTAL EROSION CHECK SLOTS TO PREVENT TOPSOIL FROM SLIDING DOWN A SLOPE. | 440 lbs/ac (10 lbs/1,000 sq ft) | 40 (100) |
| c. | APPLY SOIL AMENDMENTS AS PER SOIL TEST OR AS PRESCRIBED BY THE SEEDING SUMMARY. | | |
| d. | MIX SOIL AMENDMENTS INTO THE TOP 3 TO 5 INCHES OF SOIL OR OTHER SUITABLE MEANS. LAWN AREAS SHOULD BE RAKED TO THE SURFACE; REMOVE LARGE OBJECTS LIKE STONES AND BRICKS AND READY THE AREA FOR SEED APPLICATION. WHERE SITE IS NOT PERMIT NORMAL SEEDED PREPARATION, LOOSEN SURFACE BY DRAGGING WITH A HEAVY CHAIN OR OTHER EQUIPMENT TO THE SURFACE. STEEP SLOPES (STEEPER THAN 3H:1V) SHOULD BE A DOZER LEAVING THE SOIL IN AN IRREGULAR CONDITION, RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE. THE TOP 1 INCHES OF SOIL SHOULD BE LOOSE AND FRAGILE. SEEDED LAWN MAY NOT BE NECESSARY ON NEWLY DISTURBED AREAS. | LIME CAN BE ADJUSTED TO PERCENT N, P ₂ O ₅ , AND | |

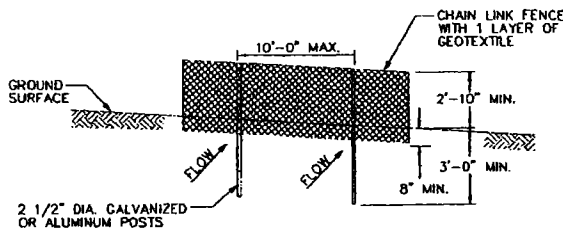
- D. SEED SPECIFICATIONS
- I. ALL SEED SHALL MEET THE REQUIREMENTS OF THE MARYLAND STATE SEED ACT. ALL SEED SHALL BE SUBJECT TO RE-TESTING BY A RECOGNIZED SEED LABORATORY. ALL SEED USED SHALL HAVE BEEN TESTED WITHIN 6 MONTHS IMMEDIATELY PRIOR TO THE DATE OF SOWING SUCH MATERIAL ON THIS JOB.

NOTE: SEED TAGS SHALL BE MADE AVAILABLE TO THE CONTRACTING OFFICE TO VERIFY TYPE AND RATE OF SEED USED.

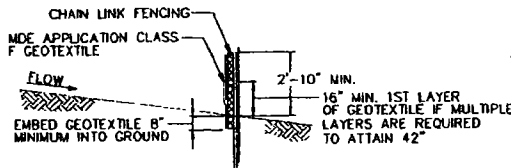
	FERTILIZER RATE	LIME RATE
10-10-10	(10-10-10)	
600 lbs/ac (15 lbs/1000 sf)		4000 lbs/ac (100 lbs/1000 sf)

	FERTILIZER RATE	LIME RATE
(10-20-20)		
440 lbs/ac (10 lbs/1,000 sf)		4000 lbs/ac (100 lbs/1,000 sf)

		DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL DISTRICT WASHINGTON, INDIAN HEAD BROAD ROAD, VIRGINIA		REV. DESCRIPTION PREP BY DATE APPROV		1. FINAL SUBMISSION SITE 42 - OLSEN ROAD LANDFILL REMEDIAL ACTION DESIGN REVEGETATION NOTES DATE		NORTH OF FOR COMMANDER, NAVFAC	
SAT TO		DATE		APPROVED		APPROVED		APPROVED	
COOP. LD. NO.		80091		SCALE: 21'-03"=4402		SPTC. NO.		SPTC. NO.	
CONSTRUCTION, CONTROL NO.		N62470-03-0-4402		NAVFAC DRAWING NO.		J4559816		SHEET	
SIZE		6 OF 16		DATE		C-4		DATE	



PERSPECTIVE VIEW



CROSS SECTION

NOTES:

1. WHEN GEOTEXTILE SECTIONS ADJOIN EACH OTHER, THEY SHALL BE OVERLAP BY 6" AND FOLDED.
2. FENCING SHALL BE 42" IN HEIGHT AND CONSTRUCTED IN ACCORDANCE WITH LATEST MARYLAND STATE HIGHWAY DETAILS FOR CHAIN LINK FENCING. THE SPECIFICATION FOR A 6" FENCE SHALL BE USED, SUBSTITUTING 42" FABRIC / 6" LENGTH POSTS.
3. CHAIN LINK FENCE SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH TIES, LOWER TENSION WIRE, BRACE AND TRUSS RODS, DRIVE ANCHORS, AND CAPS ARE NOT REQUIRED.
4. GEOTEXTILE SHALL BE FASTENED SECURELY TO THE CHAIN LINK FENCE WITH SPACED 24" AT THE TOP AND MID-SECTION.

SUPER SILT FENCE DETAIL

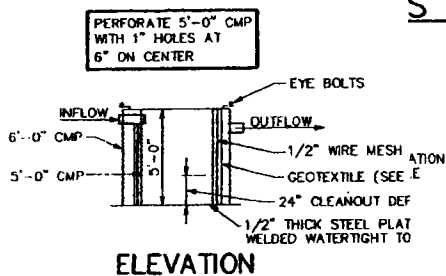
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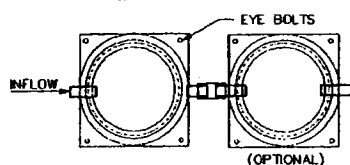
RDs AND SPECIFICATIONS FOR SOIL DETAIL 36 H-29-10 THROUGH H-29-12A.

S CULVERT DETAIL

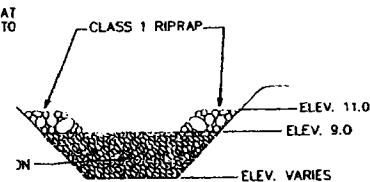
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ELEVATION



PLAN VIEW



SECTION A-A

NOTES:

1. AN EXAMPLE OF A TYPICAL SEDIMENT TANK IS SHOWN. OTHER DESIGNS CAN BE USED IF THE STORAGE VOLUME IS ADEQUATE AND IS OBTAINED FROM THE CONTRACTING OFFICER AND MDE.
2. PORTABLE SEDIMENT TANKS SHALL BE PLACED IN SERIES IF ADDITIONAL RETENTION TIME OR CAPACITY IS REQUIRED, AS DETERMINED BY THE CONTRACTOR'S "RESPONSIBLE PERSON." ONE CUBIC FOOT OF STORAGE VOLUME SHALL BE PROVIDED FOR EACH GALLON PER MINUTE OF DISCHARGE CAPACITY.
3. GEOTEXTILE MESH SIZE MAY VARY FROM TANK TO TANK IF TANKS ARE INSTALLED IN SERIES, WITH THE DOWNSTREAM MOST GEOTEXTILE MESH SIZE NOT TO EXCEED 2" STONE OVER MDE APPLICATION CLASS PE TYPE III OR BETTER.
4. DISCHARGE FROM PORTABLE SEDIMENT TANKS SHALL BE CONTROLLED TO PROTECT DOWNSLOPE AREAS FROM EROSION. EROSION CONTROLS (AD OF EROSION CONTROL MATTING, RIPRAP, ETC.) SHALL BE SUBJECT TO OFFICER AND MDE APPROVAL.

ID STANDARDS CONTROL.

PORTABLE SEDIMENT TANK

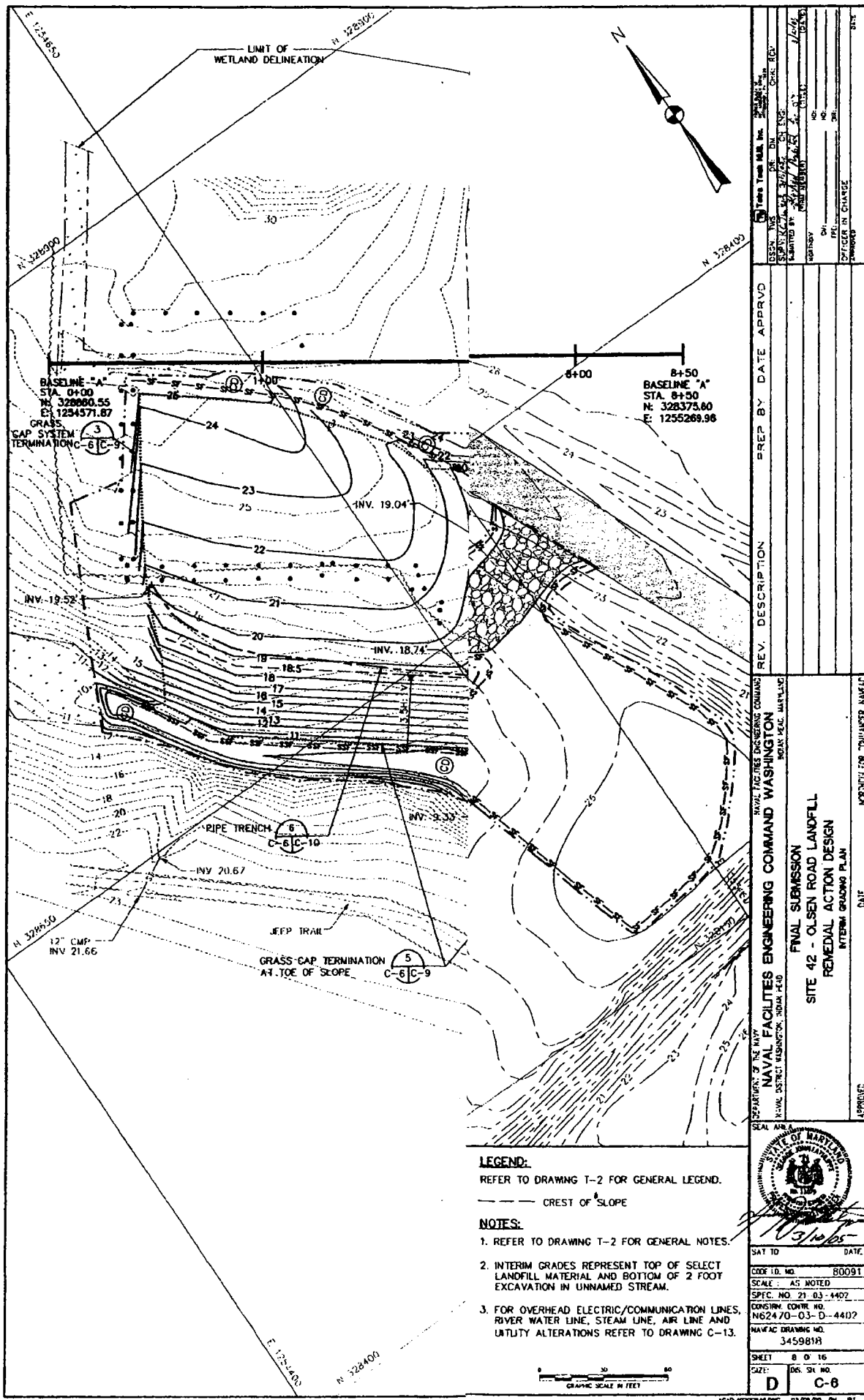
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C-21C-5

DESIGN: 105	DATE: 3/1/05	BY: J. J. J.
SCALE: 1"=10'	DATE: 3/1/05	BY: J. J. J.
REVISION: 1	DATE: 3/1/05	BY: J. J. J.
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REVISION: 100	DATE: 3/1/05	BY: J. J. J.

STATE OF MARYLAND	
DEPARTMENT OF THE NAVY	
NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON	
NAVAL DISTRICT WASHINGTON, ACAD HEAD	
FINAL SUBMISSION	
SITE 42 - OLSEN ROAD LANDFILL	
REMEDIAL ACTION DESIGN	
EROSION AND SEDIMENT CONTROL DETAILS	
APPROVED FOR COMMANDER, NAVFAC	
DATE: 3/1/05	
SHEET 7 OF 15	
SIZE: D C-6	



LEGEND:

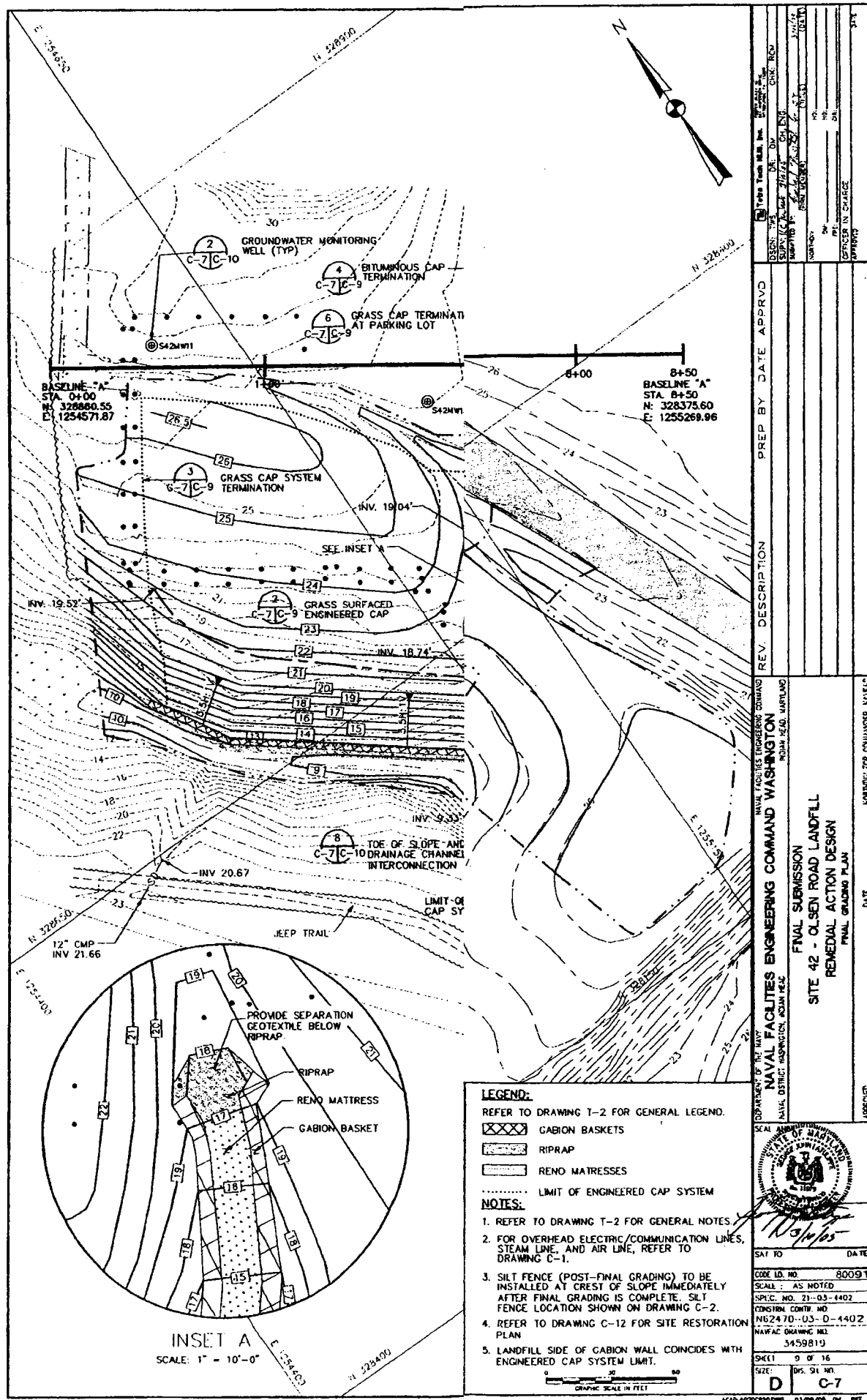
REFER TO DRAWING T-2 FOR GENERAL LEGEND.

— CREST OF SLOPE

NOTES:


1. REFER TO DRAWING T-2 FOR GENERAL NOTES.
2. INTERIM GRADES REPRESENT TOP OF SELECT LANDFILL MATERIAL AND BOTTOM OF 2 FOOT EXCAVATION IN UNNAMED STREAM.
3. FOR OVERHEAD ELECTRIC/COMMUNICATION LINES, RIVER WATER LINE, STEAM LINE, AIR LINE AND UTILITY ALTERATIONS REFER TO DRAWING C-13.

FINAL SUBMISSION SITE 42 - OLSEN ROAD LANDFILL REMEDIAL ACTION DESIGN INTERIM GRADING PLAN		DATE 03/10/05	APPROVED [Signature]
NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL DISTRICT WASHINGTON, DISTRICT HEAD NAVAL DISTRICT WASHINGTON, DISTRICT HEAD		REVISIONS NO. DATE DESCRIPTION 1 03/10/05 [Description]	DATE 03/10/05
SEAL AREA [Seal of the State of Maryland]		DATE 03/10/05	DATE 03/10/05
GRAPHIC SCALE IN FEET 0 30 60		DATE 03/10/05	DATE 03/10/05



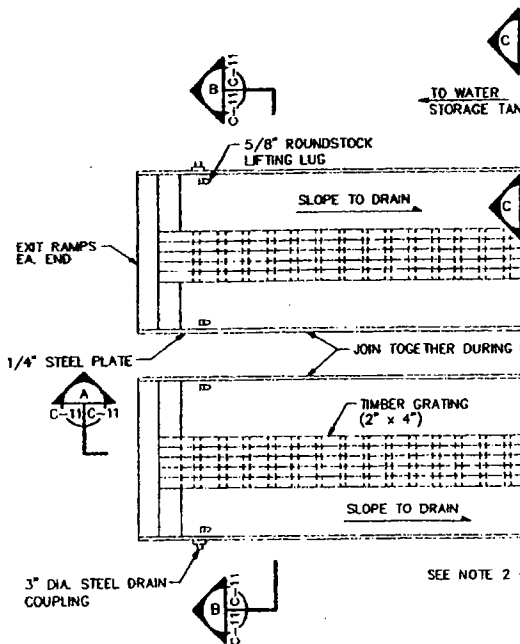
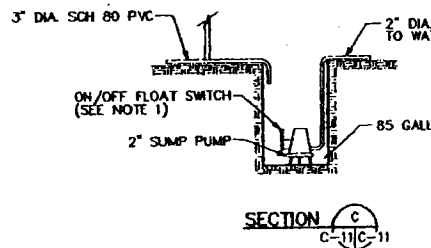
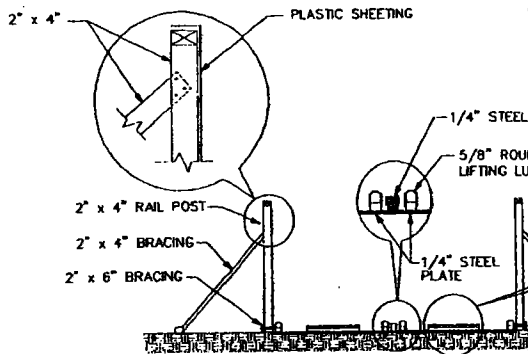
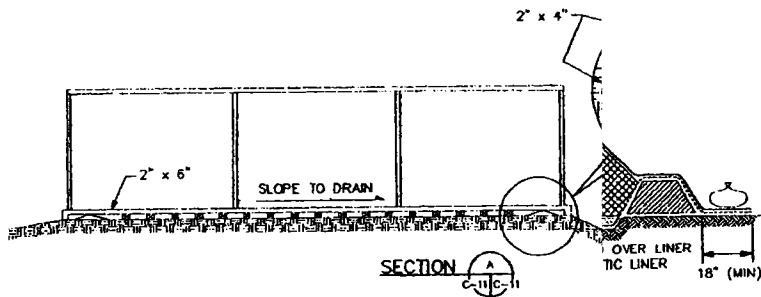
LEGEND:
REFER TO DRAWING T-2 FOR GENERAL LEGEND.

NOTES:
1. REFER TO DRAWING T-2 FOR GENERAL NOTES.

		DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL DISTRICT WASHINGTON, DISTRICT HEAD, WASHINGTON		REV. DESCRIPTION PREP BY DATE APPROV		TERRY TRUBB, INC. 1000 10th St. N.E. WASHINGTON, D.C. 20002	
SITE 42 - OLSEN ROAD LANDFILL REMEDIAL ACTION DESIGN CROSS SECTIONS		FINAL SUBMISSION		DATE: 1/13/85 BY: [Signature] FOR: [Signature]		DATE: 1/13/85 BY: [Signature] FOR: [Signature]	
APPROVED: [Signature] DATE: 1/13/85		AUTHORITY FOR COMMANDER, NAVFAC		OFFICER IN CHARGE [Signature]		[Signature]	
SAT NO. DATE		CODE NO. 80091		SCALE: AS NOTED		SPEC. NO. 21-03-4402	
CONSTRUCTION NO. 162470-03-D-4402		NAVFAC DRAWING NO. 3459820		SHEET 10 OF 16		SIZE: 11x17	
D		C-8		[Signature]		[Signature]	



SAT TO		DATE	
CODE ID. NO.		80091	
SCALE : AS NOTED			
SPEC. NO. 21-03-4402			
CONSTR. CONTR. NO.			
N62470-03-D-4402			
NAVFAC DRAWING NO.			
3459822			
SHEET		12 OF 16	
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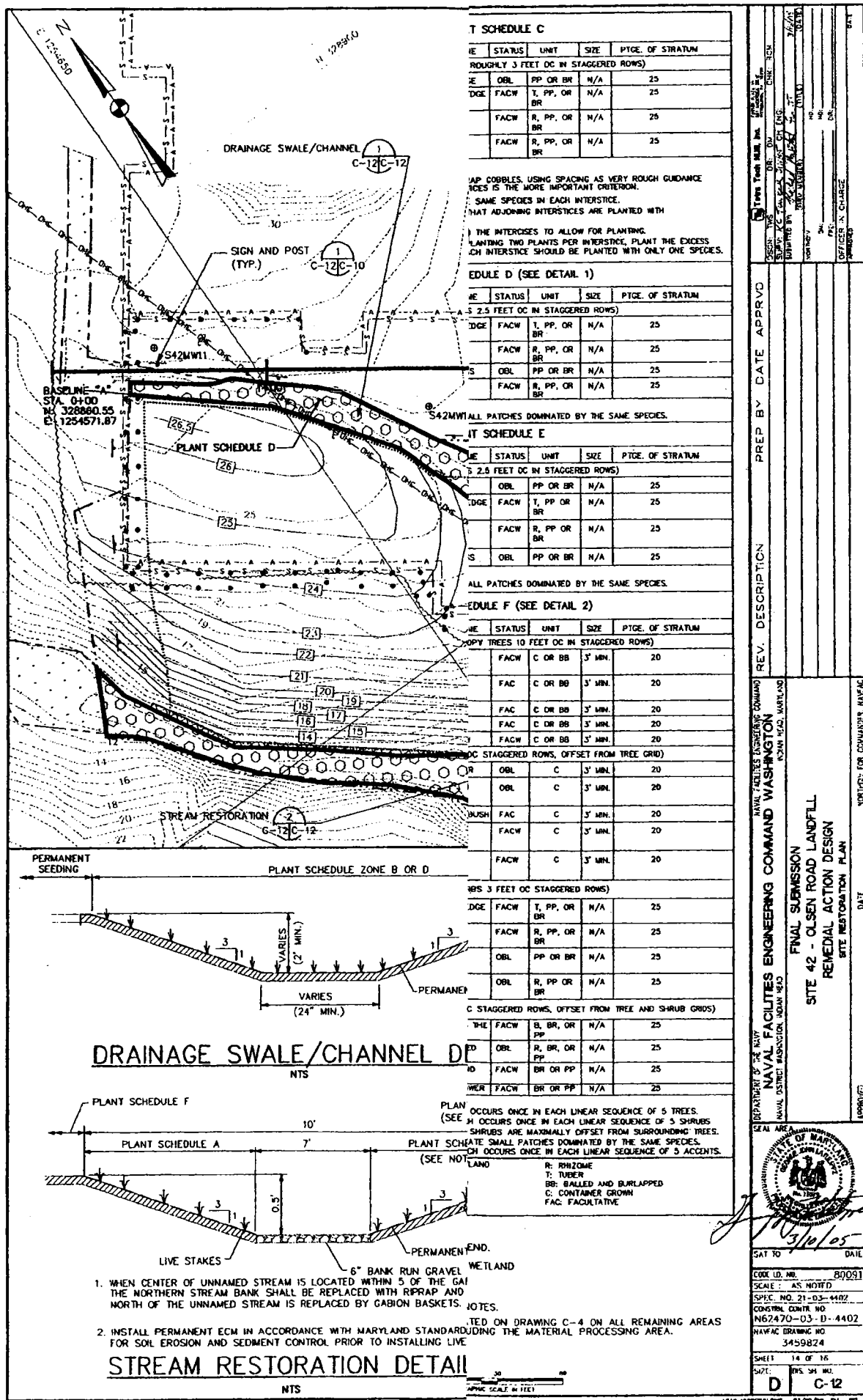


DECONTAMINATION PAD
NTS

ATION OF PUMP IS CONTROLLED BY FLOAT SO
ARTS WHEN SUMP WATER LEVEL REACHES 4"
NLET AND SHUTS OFF WHEN WATER LEVEL
AP DISCHARGE LEVEL.

IS TO BE FITTED WITH QUICK DISCONNECT
CH 80 PVC (INNER COUPLING) OR 3\"/>

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVY DISTRICT WASHINGTON, DC 20340		FINAL SUBMISSION SITE 42 - OLSEN ROAD LANDFILL REMEDIAL ACTION DESIGN MISCELLANEOUS DETAILS (SHEET 3 OF 3)	
DESIGN: TMS DRAWN: JMS CHECKED: JMS DATE: 12/10/05		OFFICE IN CHARGE JMS	
REV. DESCRIPTION PREP BY DATE APPROV		DATE	
SEAL AREA STATE OF MARYLAND PROFESSIONAL ENGINEER JMS 12/10/05		APPROVED	
SAT TO COR ID NO SCALE: AS NOTED SPEC. NO. 21-03-4402 CONSTR. CODE NO N62470-03-D-4402 NAVFAC DRAWING NO J459823		SHEET 13 OF 16 D C-11	



TELE 2' SP 2' FA 2' EL. UNKNOWN
(EXISTING)

A-A

FA 2' TELE 1' EL. APPROX.
14'-0" AFF

B-B

FA 2' TELE 2' SP 2' EL. APPROX.
2'-2" BGS

C-C

*will use T vs elbow
at upper/lower connections
of RW line
to permit thrust blocks
to cure before making
final connection*

ELECTRICAL WORK NOTES:

- E1. ALL WIRING WITH THE EXCEPTION OF THE GROUNDING CONNECTIONS SHALL BE INSTALLED BY OTHERS. PROVIDE PULL ROPE ONLY IN ALL NEWLY INSTALLED AND ABANDONED CONDUIT.
- E2. ALL CONDUIT, BOXES, FITTINGS, ETC. SHALL BE RATED FOR CLASS I, DIVISION 1, GROUP D IN AND AROUND THE LOADING DOCK AREA.
- E3. ALL CONDUIT, BOXES, FITTINGS, ETC. SHALL BE RATED FOR CLASS II, DIVISION 2, GROUP E IN THE UTILITY ROOM.
- E4. MANUAL FIRE ALARM PULL STATION LOCATED AT UTILITY POLE 9D-7D-146 SHALL BE PROVIDED WITH TEMPORARY SUPPORT DURING THE CONSTRUCTION PERIOD AND MUST REMAIN ACTIVE AT ALL TIMES.
- E5. INSTALL CONDUIT AT AN ELEVATION OF APPROX. 14'-0" ABOVE FINISHED FLOOR OF LOADING DOCK.
- E6. CONDUIT FROM LOADING DOCK TO POLE 9D-7D-143 SHALL BE INSTALLED UNDERGROUND ENCASED. PROVIDE BONDING GROUND WIRE (1/C #4 BARE STRANDED) FROM EACH CONDUIT TO EXISTING GROUND LOOP. THIS CONDUIT BANK SHALL BE EXCAVATED ENTIRELY BY HAND.
- E7. EXISTING UTILITY POLES, WIRING AND ASSOCIATED HARDWARE SHALL BE REMOVED BY OTHERS.

LEGEND:

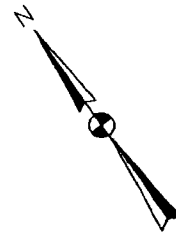
REFER TO DRAWING T-2 FOR GENERAL LEGEND.

- ✕ GUY WIRE TO BE REMOVED (BY OTHERS)
- ✕ UTILITY POLE TO BE REMOVED (BY OTHERS)
- — — ELECTRICAL CONDUIT (EMBEDDED)
- — — ELECTRICAL CONDUIT (EXPOSED)
- — ● GROUNDING BOND JUMPER
- — — DRAINAGE DITCH
- — — NEW 8" RIVER WATER LINE
- ✕ RIVER WATER LINE TO BE ABANDONED
- ▲ THRUST BLOCK

NOTES:

1. REFER TO DRAWING T-2 FOR GENERAL NOTES.
2. ABOVE-GROUND UTILITIES AND UTILITY FEATURES SOUTH OF BUILDING 1866 LOCATED BY MURPHY & SACKS OF RALEIGH, NORTH CAROLINA, DURING NOVEMBER 1997 SURVEY. REMAINING UTILITY LOCATIONS IDENTIFIED IN THE FIELD BY NDIW-III PUBLIC WORKS AND TINSUS DURING A SITE WALK CONDUCTED FEBRUARY 3 & 4, 2005.
3. THE STEAM LINE THAT CONSTITUTES THE VERTICAL LOOP OVER THE BUILDING 1866 DRIVEWAY AND THE PORTION OF THE STEAM LINES NORTH AND SOUTH OF THIS LOOP ARE ABANDONED (I.E. NOT IN USE). CONTRACTOR MAY REMOVE THESE LINES TO PROVIDE AN ALTERNATIVE ACCESS LOCATION TO THE NORTHERN SIDE OF THE SITE 42 ACTIVE STEAM LINES SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.

GRAPHIC SCALE IN FEET



PREP BY DATE APPROV REV. DESCRIPTION DATE		FINAL SUBMISSION SITE 42 - OLSEN ROAD LANDFILL REMEDIAL ACTION DESIGN UTILITY PLAN	AUTHORITY FOR CONTRACTOR: NAVFAC DATE
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NAVAL DISTRICT WASHINGTON, WASHINGTON		SEAL AREA 	
CODE NO. 00091 SCALE: AS NOTED SPEC. NO. 21-03-4402 CONSTRUCTION NO. 062470-03 0-4402 NAVFAC DRAWING NO. 3459B74A		SAT TO DATE 3/10/05	
SHEET 1 OF 16 SIZE: 11x17		D C-13	

Appendix D
Erosion and Sedimentation Control Plans (ESCP) Amendment

FINAL
EROSION AND SEDIMENT CONTROL PLAN AMENDMENT FOR
SITE 42 - OLSEN ROAD LANDFILL AND SITE 17
NAVAL DISTRICT WASHINGTON INDIAN HEAD
INDIAN HEAD, MARYLAND
Contract No. N62470-03-D-4402
Task Order No. 011

Prepared for:

Naval Facilities Engineering Command Washington
1314 Harwood Street, S.E.
Washington Navy Yard, DC 20374-5018

Prepared by:

Field Support Services, Inc.
6303 Ivy Lane, Suite 800
Greenbelt, Maryland 20770

and

Shaw Environmental, Inc.
2790 Mosside Boulevard
Monroeville, Pennsylvania 15146-2792

Reviewed by:



Steve Carriere, PMP
Project Manager
Shaw Environmental, Inc.



Paul Karmazinski
Program Manager
Field Support Services, Inc.

August 2005
Project No. 115273

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Attachment 1

Attachment 2

List of Figures

Figure	Title
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List of Attachments

Attachment	Title
1	Site 42 Erosion and Sediment Control Plan
2	Stormwater Management Waiver Application

List of Acronyms

COPCs	Chemicals of Potential Concern
EE/CA	Engineering Evaluation/Cost Analysis
ESCP	Erosion and Sediment Control Plan
FSSI	Field Support Services, Inc.
IAS	Initial Assessment Study
LANTDIV	Department of the Navy, Atlantic Division
MDE	Maryland Department of the Environment
msl	Mean Sea Level
NDW-IH	Naval District Washington Indian Head
PRGs	Preliminary Remediation Goals
ROICC	Resident in Charge of Construction
Shaw	Shaw Environmental, Inc.
TtNUS	Tetra Tech NUS, Inc.
VOCs	Volatile Organic Compounds

1.0 Introduction

Field Support Services, Inc. (FSSI) and Shaw Environmental, Inc. (Shaw) are performing a remedial/removal action at Site 42 – Olsen Road Landfill and Site 17 at the Naval District Washington Indian Head (NDW-IH) in Indian Head, Maryland. This work will be performed under Task Order 011 of the Department of the Navy, Atlantic Division (LANTDIV) Contract Number N62470-03-D-4402.

This Erosion and Sediment Control Plan (ESCP) Amendment provides the site-specific information for Site 17, which includes drum removal and disposal, soil excavation, disposal, and stockpiling, and site restoration. It should be noted that the remedial/removal action at Site 17 will be performed concurrently with and under the same Task Order as Site 42. The Site 42 ESCP was previously submitted by Tetra Tech NUS, Inc. (TtNUS) and was reviewed by the Maryland Department of the Environment (MDE) in March 2005. In order to maintain continuity throughout the project, FSSI/Shaw has developed this ESCP Amendment for Site 17 referencing the approved narrative and details from the Site 42 ESCP, which is provided as Attachment 1 of this ESCP Amendment.

2.0 Analysis

This section provides the site history, description of work, erosion and sediment control measures, and sequence of construction that will be implemented for the removal action at Site 17.

2.1 Site History

Site 17 is a 1,000-foot stretch of shoreline along the Mattawoman Creek, where metal parts were discarded from the 1960s until the early 1980s. The discarded materials included rocket motor casings, shipping containers, empty drums, and various metal parts. An Initial Assessment Study (IAS) conducted in 1983 identified the presence of rusted metal parts in the vicinity of the reported disposal area. The study also noted that the submerged materials were covered over with bottom sediments.

In 1997, the area of the site was expanded to include the forested area 100 feet from the shoreline, where dozens of rusted drums were identified. During a site reconnaissance conducted in January 2000, disintegrated drums containing a yellow, wax like material were observed at the site. In addition, some drums were partially exposed in the soil. Base personnel could not verify the origin of the drums. NDW-IH personnel analyzed the contents and determined that the substance was wax, which indicates that the substance was safe to handle (e.g., was not explosive) though possibly it contained residual levels of explosives and volatile organic carbons (VOCs).

In 2004, an Engineering Evaluation/Cost Analysis (EE/CA) was prepared to address the recommended alternative of the removal and disposal of the drums at the site and remediation of the soil through excavation and removal activities.

2.2 Site Description

Site 17 comprises approximately two acres located in the southwestern portion of NDW-IH, east of Site 11 - Caffee Road Landfill (Figure 1-2 from the Site 42 ESCP, TtNUS, 2005 provided in Attachment 1). The site stretches approximately 1,000 feet along the shoreline of the Mattawoman Creek and extends back approximately 100 feet from the shoreline into a wooded area near Building 1569.

Soil underlying the site consists of fill material in the upper 10 to 12 feet of the subsurface. The fill is characterized by greenish clay with silt containing wood fragments. The fill is underlain by fine to medium sand with some clay. The groundwater table, as determined from monitoring wells installed at the site, ranges from about 1.4 feet above mean seal level (msl) along the shoreline to 6.7 feet above msl up-gradient of Site 17. Groundwater flow is generally from northwest to southeast and discharges to Mattawoman Creek.

2.3 Project Description

Two areas have been identified for soil removal and are shown in Figure 1. The Southwest Area has a volume of approximately 400 cubic yards and the Northeast Area has a volume of approximately 20 cubic yards. The depth of excavation is assumed to be 12 inches at both areas. The soil removed from these two areas will be stockpiled at Site 11 and consolidated when the landfill at Site 11 is capped.

Rusted drums located throughout the northern and western portions of the site will be removed and disposed of off site. The three approximate areas of these drums are shown in Figure 1. The vertical extent of excavation in areas where drums are partially exposed is estimated to extend to a depth of two feet.

Following soil excavation, confirmatory sampling will be performed to determine if Preliminary Remediation Goals (PRGs) have been met for the Chemicals of Potential Concern (COPCs) (lead, mercury, and zinc). Once cleanup goals are met, the excavated areas will be backfilled with clean soil, regraded, and seeded with native grasses.

2.4 Erosion and Sediment Control Measures

Erosion and sediment control measures will be implemented, installed, and maintained according to the standards and specifications in the 1994 Maryland Erosion and Sediment Standards and Specifications for Soil Erosion and Sediment Control Manual developed by MDE. The required erosion and sediment control measures are: earth dikes, stabilized construction entrances, silt fence, temporary seeding, permanent seeding, and erosion control matting. Figure 1 shows the locations of these controls and they are described below.

Earth Dike

In order to divert runoff from the surrounding areas, earth dikes will be constructed per Detail 1 and at the locations shown on Figure 1 of this ESCP Amendment. These berms will be constructed in accordance with Section 1.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. The earth dikes will be Type A-2 lined with erosion control matting.

Stabilized Construction Entrances

A stabilized construction entrance will be provided at the eastern end of Caffee Road to allow access to Site 17 from the southern side of the site, as shown in Figure 1. The construction of the stabilized construction entrance will conform to Section 17.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. A construction detail is provided on the Erosion and Sediment Control Detail Sheet (Design Drawing C-5 from the Site 42 ESCP, TtNUS, 2005 provided in Attachment 1). The stabilized construction entrance will be constructed prior to construction or placement of any other erosion and sediment control device. Loose dirt will be removed from the tires of construction vehicles as they traverse the stabilized construction entrance.

In addition, a stabilized entrance (swale) will be constructed within the access road at the entrance of the excavation. The purpose of this structure is to dissipate the flow from the earth dike.

Silt Fence

Silt fence will be placed down-gradient of the stabilized construction entrance, access road, decontamination pad, and excavation areas as shown in Figure 1. The approximate length of silt fence required is 600 feet. The maximum slope length is 125 feet for a slope of 5 percent which is in accordance with Section 15.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. A silt fence construction detail is provided on the Erosion and Sediment Control Detail Sheet (Design Drawing C-5 from the Site 42 ESCP, TtNUS, 2005 provided in Attachment 1).

Temporary Seeding

Temporary seeding will be used on regraded areas that will be left dormant for longer than 14 days. Site preparation and seeding methods will conform to the standards presented in Section

20.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. General seeding notes are provided on the Revegetation Notes Sheet (Design Drawing C-4 from the Site 42 ESCP, TtNUS, 2005 provided in Attachment 1).

Permanent Seeding

Permanent seeding will occur as soon as possible following the establishment of final grades. Site preparation and seeding methods will conform to the standards presented in Section 20.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. General seeding notes and the permanent seed mixture are presented on the Revegetation Notes Sheet (Design Drawing C-4 from the Site 42 ESCP, TtNUS, 2005 provided in Attachment 1). A detailed Permanent Stabilization narrative is also presented in Section 2.7 of the Site 42 ESCP (Attachment 1).

Erosion Control Matting

Erosion control matting will be placed on the earth dikes as shown in Detail 1 on Figure 1 of the ESCP Amendment. The erosion control matting will be installed in accordance with Section 22.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control.

2.5 Sequence of Construction

The time required to perform construction activities at Site 17 is estimated to be 10 weeks due to scheduling restrictions at Site 42. The generalized sequence of construction is included on Figure 1 and as follows:

1. Hold a pre-construction meeting with the NDW-IH, MDE, and Contractor Representatives to discuss and finalize procedures for the work at Site 17.
2. Mobilize personnel and equipment to the site.
3. Inspect site prior to construction to verify existing conditions and underground utility locations.
4. Establish horizontal and vertical control for construction. Stake the locations of all areas to be excavated or disturbed prior to actual work.
5. Perform clearing activities for erosion and sediment controls to be installed.
6. Install the erosion and sediment controls including, earth dikes, stabilized construction entrances and silt fencing.

7. Perform remaining clearing and grubbing activities within the limits of disturbance.
8. Construct the material processing area at Site 11.
9. Construct the decontamination pad.
10. Remove and overpack the drums from the three designated areas.
11. Excavate the Southwest and Northeast Areas and transport the excavated material to the material processing area at Site 11. Following screening, transport material to an appropriate off-site disposal facility or stockpile material at Site 11.
12. Backfill and regrade the disturbed areas of the site.
13. Plant permanent vegetation over all disturbed areas.
14. Hold a final inspection, to be attended by the Contractor, an MDE Representative, and a Resident in Charge of Construction (ROICC), to determine punch list items and develop a timetable for the removal of the temporary erosion and sediment control measures.
15. Conduct a final survey of the site.
16. Remove remaining temporary erosion and sediment controls after receiving approval from the ROICC.
17. Demobilize personnel and equipment when appropriate.

3.0 Stormwater Management

In accordance with Section 3.3.A.1 of the Maryland Stormwater Management Guidelines for State and Federal Projects, July 2001, the Owner requests a stormwater management waiver be granted for Site 17. The area to be disturbed is gently sloped and wooded. The area will be excavated and then backfilled to meet the original grades. The disturbed area will be revegetated. The Stormwater Management Waiver Application is provided in Attachment 2 of this ESCP Amendment (will be completed with final submittal).

4.0 Conclusions

This ESCP Amendment will be effective in preventing erosion from occurring and containing sediment on the site during the drum removal, soil excavation, and site restoration activities at Site 17. The remedial/removal action at Site 42 and Site 17 will minimize the risks to human health and the environment associated with exposure to buried drums and contaminated soils.

O:\Project\LANDM\Indian Head\115273\115273D4.dwg
Plot Date/Time: 09/01/05 04:19pm
Plotted by: bernadette.oconnor

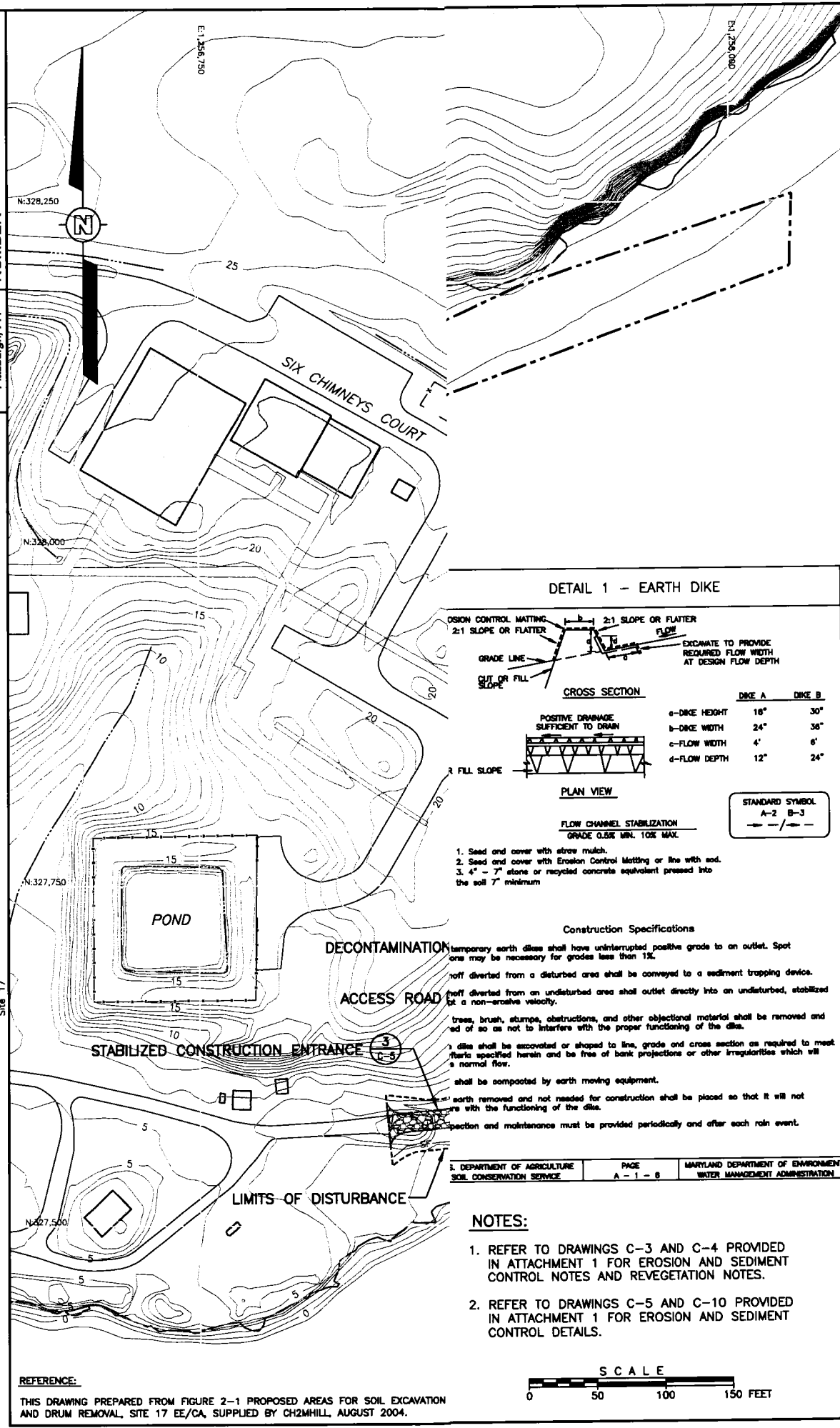
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Image: NAVFAC

Site 17

OFFICE
Pittsburgh, PA

DRAWING
NUMBER 115273-D4



Shaw Shaw Environmental, Inc.

NAVFAC
Naval Facilities Engineering Command
NAVAL WASHINGTON

INDIAN HEAD, MARYLAND
NAVAL DISTRICT WASHINGTON, INDIAN HEAD
EROSION AND SEDIMENT CONTROL PLAN AMENDMENT
FOR SITE 42 AND SITE 17
SITE 17 - EROSION AND SEDIMENT CONTROL PLAN

DESIGNED BY P. Corbale 4/13/05
CHECKED BY P. Anderson 4/20/05
DRAWN BY B. Faison 4/13/05
APPROVED BY S. Corbale 8/31/05

REVISIONS
BY DATE REV

SCALE: AS SHOWN
DELIVERY ORDER NO. 011
CONSTR. CONTRACT NO. N62470-03-D-4402
NAVFAC DRAWING NO. --
SHEET I.D.
FIGURE 1

Attachment 1

Erosion and Sediment Control Plan for Site 42 – Olsen Road Landfill

**Naval District Washington,
Indian Head
Indian Head, Maryland**



**Naval Facilities Engineering Command
Washington**

Contract Number N62467-94-D-0888

Contract Task Order 0805

March 2005

REVISION 0
MARCH 2005

**EROSION AND SEDIMENT CONTROL PLAN
FOR
SITE 42 – OLSEN ROAD LANDFILL**

**NAVAL DISTRICT WASHINGTON,
INDIAN HEAD
INDIAN HEAD, MARYLAND**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:
Naval Facilities Engineering Command Washington
1314 Harwood Street, S.E.
Washington Navy Yard, D.C. 20374-5018**

**Submitted by:
Tetra Tech NUS, Inc.
600 Clark Avenue, Suite 3
King of Prussia, Pennsylvania 19406-1433**

**CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0805**

MARCH 2005

PREPARED UNDER DIRECTION OF:



**KIM C. TURNBULL
PROJECT MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA**

APPROVED FOR SUBMISSION BY:



**JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
TETRA TECH NUS, INC.
KING OF PRUSSIA, PENNSYLVANIA**

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A.2	TEMPORARY ACCESS CULVERT EVALUATION
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FIGURES

NUMBER

1-1	Facility Location Map
1-2	Site Location Map
2-1	Site Layout Map
2-2	Soils Map

ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
BMP	Best management practices
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
COMAR	Code of Maryland Regulations
Cpv	Channel protection storage volume
CTO	Contract Task Order
cy	Cubic yards
E/A&H	ENSAFE/Allen & Hoshall
ECM	Erosion control matting
FACU	Facultative upland
FACW	Facultative wetland
FS	Feasibility Study
HSG	Hydrologic soil group
IR	Installation Restoration
IW71	Industrial Wastewater Outfall 71
MDE	Maryland Department of the Environment
NDW-IH	Naval District Washington, Indian Head
NEESA	Naval Energy and Environmental Support Activity
NOI	Notice of intent
NOT	Notice of termination
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OBL	Obligate wetland
PA	Preliminary Assessment
PLS	Pure live seed
RAC	Remedial Action Contractor
RAD	Remedial Action Design
RAO	Remedial action objective
RI	Remedial Investigation
ROD	Record of Decision
SCS	Soil Conservation Service
sf	Square feet
SI	Site Inspection
Site 42	Olsen Road Landfill

TBC	To be considered
TP	Total phosphorous
TSD	Treatment, storage, or disposal
TSS	Total suspended solids
TtNUS	Tetra Tech NUS, Inc.
UPL	Upland
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UXO	Unexploded ordnance
WQv	Water quality volume

1.0 INTRODUCTION

This Erosion and Sediment Control Plan was prepared under Contract Task Order (CTO) 0805 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62467-94-D-0888. Under this CTO, Tetra Tech NUS, Inc. (TtNUS) is performing engineering, design, and post-construction award services for the remedial action design (RAD) at Site 42 - Olsen Road Landfill (Site 42) at the Naval District Washington, Indian Head (NDW-IH) in Indian Head, Maryland. The RAD consists of engineered cap system installation, excavation, screening, and off-site disposal of potential hazardous waste (hot spot) landfill material that cannot be consolidated beneath the engineered cap, implementation of land use controls, long-term monitoring, and site reviews to protect public health and the environment.

NDW-IH is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC, as shown on Figure 1-1. The NDW-IH is a military facility consisting of the Main Area on the Cornwallis Neck Peninsula and the Annex on Stump Neck. The Main Area is bounded by the Potomac River to the northwest, west, and south, by Mattawoman Creek to the south and east, and by the Town of Indian Head to the northeast. Stump Neck Annex is located across Mattawoman Creek and is not contiguous with the Main Area. The primary mission of NDW-IH is to provide services in energetics, ordnance devices and components, and other related ordnance engineering standards including chemicals, propellants, and their propulsion systems, explosives, pyrotechnics, warheads, and simulators. The United States Environmental Protection Agency (USEPA) added NDW-IH to the National Priorities List (NPL) in September 1995 pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. Site 42 is one of the Installation Restoration (IR) sites at the Main Area currently included in the NDW-IH IR Program (EFA, Chesapeake, 2002). This RAD is limited to Site 42 in the Main Area of NDW-IH (Figure 1-2).

1.1 SITE HISTORY

Between 1982 and 1987 and during construction of Building 1866 in 1992, a 1.43-acre near the current location of Building 1866 was used for unauthorized disposal site of solid wastes. A Preliminary Assessment (PA) conducted by Naval Energy and Environmental Support Activity (NEESA) prior to the construction of Building 1866 concluded that unauthorized disposal occurred at the site over a 5-year period ending in 1987. The report also noted that there was no record of hazardous waste disposal, and no such disposal was recalled by facility personnel (NEESA, 1992). However, some soil encountered in test pits installed at the site may be classified as a characteristic hazardous waste. Additional testing would be needed to verify this. Based on pre-landfilling topography, current topography, observations made during the 2002 and 2003 field investigations, and the boring logs from previously installed

monitoring wells, Site 42 contains approximately 13,310 cubic yards (cy) of landfilled material within an area of 62,290 square feet (sf) (1.43 acres) (TtNUS, 2003).

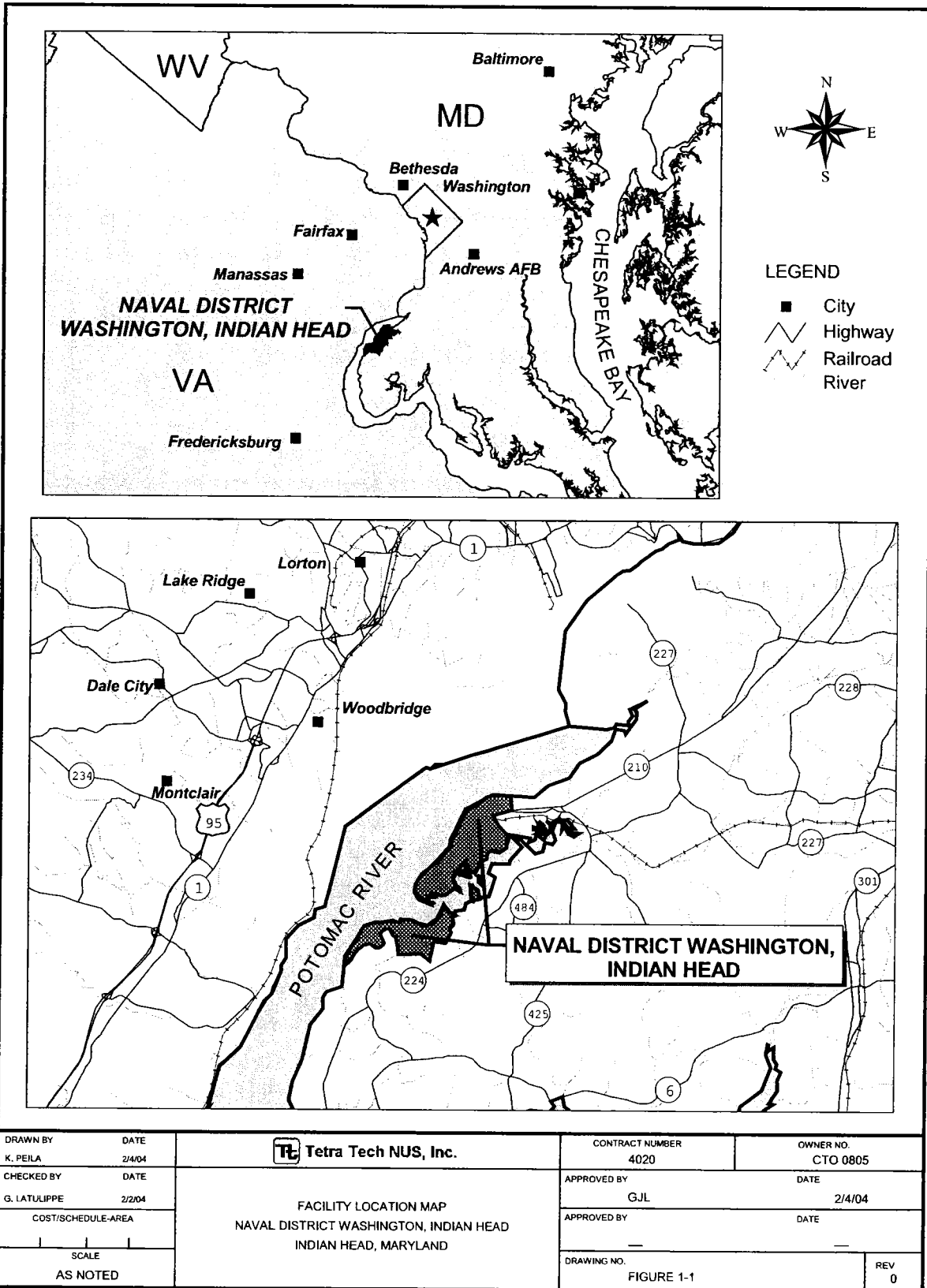
Soil, groundwater, surface water, and sediment samples were collected during a Site Inspection (SI) in 1991 and 1992. A Remedial Investigation (RI) performed at the site in 1997 included surface soil, groundwater, surface water, and sediment sampling (TtNUS, 1999). The SI and RI identified the types, quantities, and locations of contamination. In September 1999, TtNUS conducted a pre-Feasibility Study (FS) field investigation to define the horizontal extent of the areas requiring remediation to support the development of the FS. Additional FS investigations conducted in late January/early February 2002 and in February 2003 included the installation of three monitoring wells (2002 investigation) and the excavation of 12 test pits (one test pit in 2002 and 11 test pits in 2003) (TtNUS, 2003).

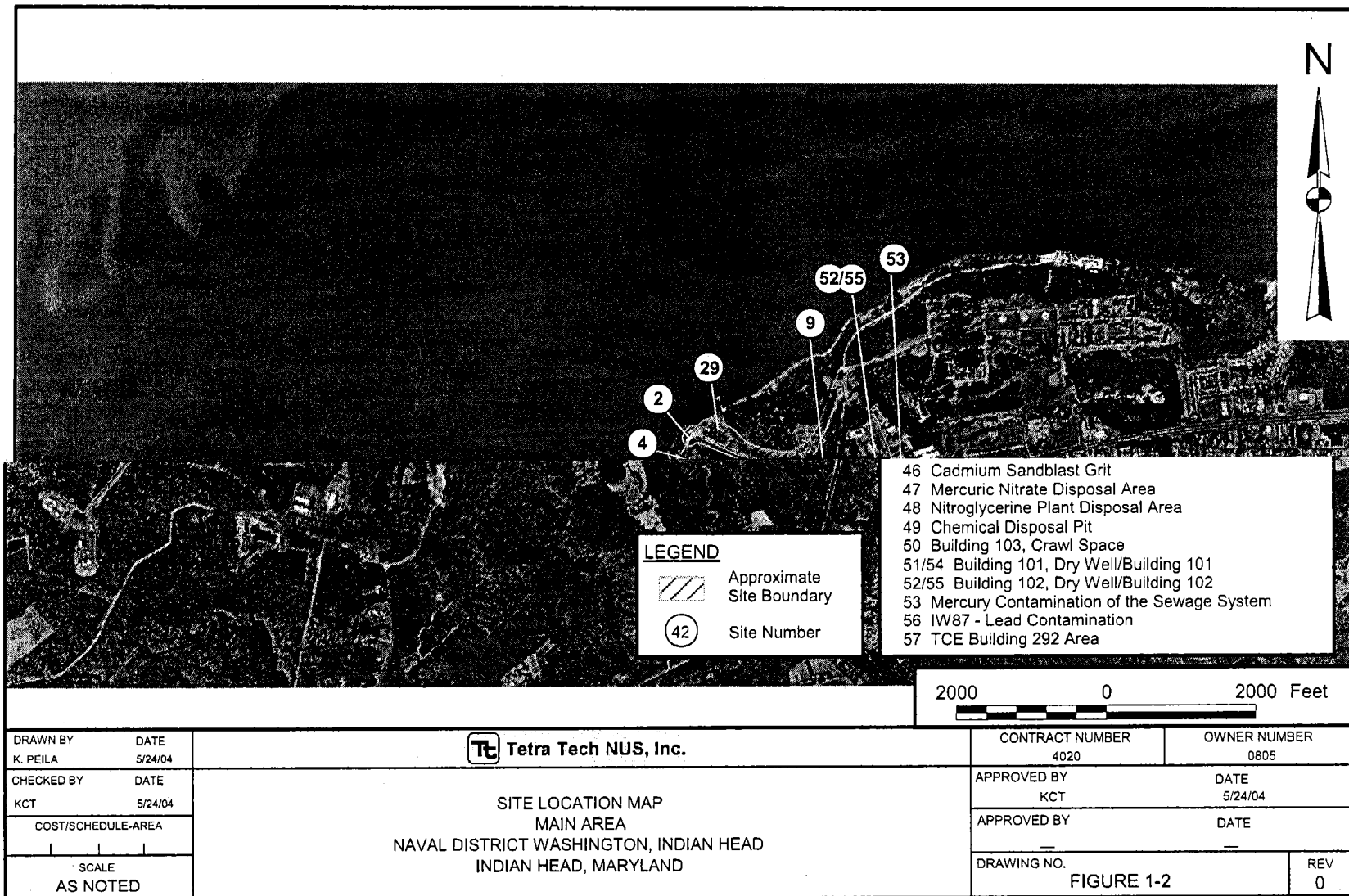
1.2 REPORT OBJECTIVE

The objective of this report is to describe the project and present the erosion and sediment control measures that will be used during implementation of the remedial action at Site 42.

1.3 REPORT FORMAT

Section 2.0 presents a narrative about the requirements for erosion and sediment control plans. Section 3.0 presents a generalized sequence of construction. Section 4.0 presents conclusions. Erosion and Sediment Control calculations are presented in Appendix A. Construction drawings, including Design Drawing C-2 "Erosion and Sediment Control Plan," and technical specifications are presented under separate cover.





2.0 NARRATIVE REQUIREMENTS

Site 42 is an inactive landfill comprising approximately 1.43 acres within the main area of NDW-IH. The location of Site 42 is illustrated on Figure 1-2, and the site layout is illustrated on Figure 2-1.

2.1 PROJECT DESCRIPTION

The selected remedy for Site 42 as identified in the Record of Decision (ROD) includes construction of a multilayered engineered cap, excavation, screening, and off-site disposal of potential hazardous waste and some landfill material that cannot be consolidated beneath the engineered cap, implementation of land use controls, long-term monitoring, and site reviews (USEPA, et al., 2005). The Navy's goal is to begin remedial actions at NDW-IH as soon as possible to protect human health and the environment and to comply with Applicable or Relevant and Appropriate Requirements (ARARs) and to be considered (TBC) criteria. The selected remedy meets the remedial action objectives (RAOs), provides adequate protection of human health and the environment, and achieves ARARs. The remedy does not include remediation of the shallow groundwater because the shallow groundwater beneath the landfill is not within the area of attainment, as defined by the USEPA. Consequently, restoration of groundwater within the boundary of the waste remaining is not needed. Migration of shallow groundwater contaminants is not adversely affecting surface water or sources of potable water. However, the installed engineered cap will reduce future migration of contaminants to the shallow groundwater, and groundwater use restrictions will be implemented to prohibit use of shallow groundwater. Shallow groundwater beyond the landfill boundary is not contaminated.

2.2 EXISTING SITE CONDITIONS

Site 42 - Olsen Road Landfill comprises approximately 1.43 acres located in the southwestern portion of NDW-IH. The site includes a portion of the paved area south of (Building 1866) and the undeveloped land southwest of Building 1866 (Figure 2-1). The site slopes gently to the south in the area of Building 1866, with steeper grades to the south and west in the undeveloped portion of the site. Debris visible in the undeveloped portion of the site includes construction rubble (asphalt and concrete), unlabeled empty cans and drums, wooden pallets, and branches. According to the SI report [ENSAFE/Allen & Hoshall (E/A&H), 1992], early maps of the site indicate that the topography has changed over time, indicating the possibility of filling. Several utilities traverse the site including above-ground steam and pressurized air lines, overhead electrical and communication lines, underground electrical and communication lines, and underground water lines (fire and potable). Due to the operations in Building 1866 and surrounding buildings, these utility services must be maintained during the remedial action.

Site surface water flows southward to the unnamed stream located south and southwest of Site 42. This stream collects overland flow and flow from two drainage ditches located east and west of the southeastern portion of the landfill. Overland flow and an 8-inch diameter drainage pipe feed the eastern drainage ditch. The western drainage ditch is fed by overland flow and two drainage swales located north of the northwestern portion of the landfill. The combined flow in the stream flows south through Industrial Wastewater Outfall 71 (IW71) and on to Mattawoman Creek. IW71 is a riprap berm that measures approximately 25 feet wide (across the stream) and 20 feet long (along the stream) and acts as a detention device by trapping sediment in runoff.

Access to the site north of the steam lines is available through the parking facility of Building 1866. However, to access the portion of the site south of the steam lines, a temporary roadway will need to be constructed. The access road can either be located west of Site 42 connecting with Strauss Avenue or east at the southern end of the site under the steam lines and connect with Olsen Road northeast of the site.

2.3 OFF-SITE AREAS

Areas in the vicinity of Site 42 but not within the limits of the Site 42 landfill include Building 1866 and portions of its parking lot, the portions of the stream located at the base of the Site 42 slope, the swales along the northern side of the northwestern portion of the landfill, the drainage ditches to the east of the southeastern portion of the landfill, the wooded areas west, south, and east of Site 42, Olsen Road, and Strauss Road. Each of these areas, although not within the limits of the Site 42 landfill, are either located within or are adjacent to the limits of disturbance for the RAD. Due to the operations of Building 1866 and adjacent Building 3069, access to Site 42 will be restricted. Access restriction may necessitate the construction of a processing area located ½ mile or more away from Site 42 for screening all materials being disposed off-site for potential ordnance items. Erosion and sediment control devices at the site and at locations away from the site are required to protect these off-site areas during construction. The erosion and sediment control devices selected for the protection of these areas are described in this report (Section 2.6) and are shown on Design Drawing C-2 "Erosion and Sediment Control Plan."

2.4 SOILS

A soils map of the site from the Soil Conservation Service (SCS), [United States Department of Agriculture (USDA), 1974], is provided as Figure 2-2. The approximate location of the site is indicated on the figure. The soil types present at Site 42 include the following:

- KpA Keyport Silt Loam (0 to 2 percent slopes)
- KpB2 Keyport Silt Loam (2 to 5 percent slopes)
- KpC2 Keyport Silt Loam (5 to 12 percent slopes)

Keyport Silt Loam: The Keyport series consists of moderately well-drained, nearly level to moderately sloping soils. These soils are found at low elevations near major rivers but can be found at higher elevations on uplands. In a representative profile, the surface layer is silt loam about 11 inches thick. It is dark-grayish brown in the thinner, upper part and light-yellowish brown below. The upper part of the subsoil, which is about 5 inches thick, is yellowish brown, heavy silt loam. The middle part is approximately 23 inches thick and is yellowish brown silty clay or heavy silty clay loam mottled with light gray. The lower part of the subsoil, about 17 inches thick, is light-gray, fine sandy loam mottled with yellowish brown. The underlying material, to a depth of 66 inches, is gravelly sand loam of various colors. As slopes increase, the profile remains the same but the surface silt loam layer becomes thinner. In areas with slopes of 5 to 12 percent, the soil has lost much of its top layer. Keyport soils are easy to work when moisture content is favorable and where erosion is not severe. They have high available moisture capacity and permeability is slow. These soils are limited by impeded drainage, slow movement of water through the subsoil, and a hazard of further erosion (USDA, 1974). According to SCS Urban Hydrology for Small Watersheds (USDA, 1986), the hydrologic soil group (HSG) for Keyport Silt Loam is C.

2.5 CRITICAL AREAS

Critical areas are those that have potentially serious erosion problems due to the presence of steep slopes, poor vegetative cover, or runoff channels or areas identified as wetlands. The critical areas associated with Site 42 (within the limits of disturbance) include the delineated wetlands located within the landfill limits, existing drainage channels east of Site 42, and the slopes of the regraded landfill. Critical areas adjacent to Site 42 include the delineated wetlands south of the site and the delineated wetland area east of the site. No other critical areas have been identified on or adjacent to Site 42. However, during construction, other areas may require temporary protection while portions of the site are unvegetated. The Contractor will be responsible for identifying these areas in their work plan and for protecting these areas during construction. Other critical areas not on or adjacent to the site include potential soil borrow area(s) and the off-site processing location. This report does not address erosion and sediment controls for off-site borrow area(s) or off-site processing locations other than to indicate that, if an erosion and sediment control plan is not available for these potential areas of disturbance, the Contractor must provide one. Section 2.6 describes the erosion and sediment control devices proposed for the protection of these critical areas. Design Drawing C-2 illustrates the locations of the selected erosion and sediment control devices.

2.6 EROSION AND SEDIMENT CONTROL MEASURES

Erosion and sediment control measures will be implemented, installed, and maintained according to the standards and specifications in the 1994 Maryland Erosion and Sediment Standards and Specifications for Soil Erosion and Sediment Control Manual [Maryland Department of the Environment (MDE), 1994] unless otherwise noted in this plan and the construction documents. Design specifications for erosion and sediment control structures have been obtained from the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. Calculations supporting the use of erosion and sediment control devices and spacing of erosion and sediment control devices are provided in Appendix A.

Definitions, purposes, and requirements of the erosion and sediment control devices described below are as indicated in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control (MDE, 1994). The required erosion and sediment control measures are shown on Design Drawing C-2 and are as follows:

- Stabilized construction entrances will be provided at each site access location and at the entrance and exit to the off-site processing area. These devices will be constructed prior to construction or placement of any other erosion and sediment control device. The on-site construction entrances will be located adjacent to the Building 1866 parking area and off Olsen Road (east of Site 42). The off-site processing area construction entrance will be located by the Contractor and approved by the Contracting Officer. Loose dirt will be removed from the tires of construction vehicles as they traverse the stabilized construction entrances. The locations of these control measures should be identified in the Contractor's work plan and are subject to approval by the Contracting Officer and MDE.
- Super silt fence will be placed along the delineated wetland boundaries south and east of the southeastern portion of the landfill to protect the wetlands during construction. The super silt fence will be placed prior to clearing and grubbing and will need to be removed as the proposed construction approaches the wetlands. The locations of this control measure should be identified in the Contractor's work plan and are subject to approval by the Contracting Officer and MDE.
- Silt fence will be placed to protect the stabilized construction entrances, material laydown areas, access roads, decontamination pads, stockpile areas, and the off-site processing area. The locations of silt fence use should be identified in the Contractor's work plan and are subject to approval by the Contracting Officer and MDE.
- Permanent and temporary seeding will be used throughout the construction process to stabilize disturbed areas. Seeding should occur as work progresses and areas are brought to final grade (i.e.,

staged seeding). Temporary seeding is to be used on prepared grades when established grades will be exposed for longer than 14 days or longer than 7 days for steep slopes (i.e., if permanent seeding is not scheduled to occur within the times indicated, temporary seed should be used on established grades). Permanent seeding should be performed as soon as possible after the graded area is completed. Establishment of permanent stabilization is subject to approval by the Contracting Officer and MDE.

- Portable sediment tanks will be used to remove sediment from decontamination water and water generated during excavation dewatering activities.
- Temporary access culverts will be placed within the drainage ditches located along the eastern sides of the southeastern portion of the landfill to allow for access road construction for transporting equipment and materials to and from Site 42.

2.6.1 Structural Practices

The following structural practices will be used during and/or following construction activities at Site 42 to control erosion and sedimentation. The number listed with each practice, if any, references the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control (MDE, 1994).

Stone Check Dams - 8.0. Stone check dams are stone weirs placed in series in swales or ditches. The stone check dams are constructed to reduce runoff velocities to non-erosive rates and to prevent channel erosion in drainageways. The placement and construction of the stone check dams will conform to Section 8.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. The stone check dams will be installed where indicated on Design Drawing C-2. A stone check dam construction detail is provided on Design Drawing C-5, and an evaluation on the use and spacing of stone check dams is provided in Appendix A. The stone check dams will be removed after all disturbed areas are stabilized.

Sediment Tank - D14.0. A sediment tank is a compartmented tank/container through which sediment-laden water is pumped to trap and retain the sediment. Sediment tanks will be used to remove sediment from decontamination water and from water generated during dewatering activities. The sediment collected during the excavation and regrading of landfill material will be used in the select landfill material layer or transported and disposed off site. Sediment collected after the construction of the common fill layer will be stockpiled for use on or off-site as directed. Water from the decontamination pads and excavations will be stored in temporary holding tanks for characterization and proper disposal at an approved off-site treatment, storage, or disposal (TSD) facility. Sediment tanks will be located near decontamination pads, materials handling pads, the material processing area, and the excavation and

regrading area. The placement and construction of the sediment tanks will conform to Section 14.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. Proposed sediment tank locations are shown on Design Drawing C-2, and a construction detail is provided on Design Drawing C-5.

Silt Fence - E15.0. A silt fence is a temporary barrier of woven geotextile used to intercept, reduce the velocity of, and filter surface runoff from disturbed areas. The placement of the silt fence will conform to Section 15.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. The silt fence will be installed where indicated on Design Drawing C-2 and will be the minimum erosion and sediment control device used around off-site borrow areas, off-site stockpile locations, and the off-site material processing area, which are not shown on Design Drawing C-2. A silt fence construction detail is provided on Design Drawing C-5, and an evaluation on the use of silt fence is provided in Appendix A.

Stabilized Construction Entrance - 17.0. A stabilized construction entrance is a stabilized layer of aggregate underlain with geotextile. Stabilized construction entrances will be located at any point where traffic enters or leaves the construction site. The construction of a stabilized construction entrance will conform to Section 17.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. The stabilized construction entrances will be installed where indicated on the Erosion and Sediment Control Plan (Design Drawing C-2). The locations of the stabilized construction entrances should be determined by the Contractor and are subject to the approval of the Contracting Officer and MDE. A construction detail is provided on the Erosion and Sediment Control Detail sheet (Design Drawing C-5).

Temporary Seeding - 20.0. Temporary seeding involves providing vegetation consisting of annual grass or grain to provide cover on disturbed areas for up to 12 months. Temporary seeding must be performed on all regraded areas that will be left dormant for extended periods of time (14 days for gently to moderately sloped areas, 7 days for steeply sloped areas). Temporary seed must be fast-germinating vegetation placed immediately following grading. Seeding will be performed with annual rye grass. Site preparation and seeding methods will conform to the standards presented in Section 20.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. General seeding notes are provided on Design Drawing C-4.

Permanent Seeding - 20.0. Permanent seeding involves providing vegetation consisting of grass and legumes to establish ground cover for a minimum period of 1 year on disturbed areas generally receiving low maintenance. Permanent seeding must occur as soon as possible following the establishment of final grades. Permanent seed mixtures are a mixture of annual and perennial seeds that will minimize erosion

and provide suitable cover for wildlife. Site preparation and seeding methods will conform to the standards presented in Section 20.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. General seeding notes are provided on Design Drawing C-4. The permanent seed mixture is presented on Design Drawing C-4 and in Section 2.7 of this Erosion and Sediment Control Plan.

Mulching - 20.0. All areas receiving permanent seeding will be mulched with an organic material to prevent erosion by protecting the soil surface from raindrop impact and to reduce the velocity of overland flow. Mulching should be performed in accordance with Section 20.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. General mulching notes are provided on Design Drawing C-4.

Erosion Control Matting (ECM) - 22.0. Permanent ECM will be used to help stabilize portions of the landfill cap and drainage channels until final stabilization is established and will be rated to withstand flow rates of 12 feet per second (permanent ECM). The ECM will be installed in accordance with Section 22.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control.

Super Silt Fence - 26.0. A super silt fence is a temporary barrier of geotextile over chain-link fence used to intercept sediment-laden runoff from small drainage areas. The placement of the super silt fence will conform to Section 26.0 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. The super silt fence will be installed where indicated on the Erosion and Sediment Control Plan (Design Drawing C-2). A super silt fence construction detail is provided on Design Drawing C-5, and an evaluation on the use of super silt fence is provided in Appendix A.

Temporary Access Culvert - 29.10. A temporary access culvert is a structure consisting of a section or sections of circular pipe, pipe arches, or oval pipes of reinforced concrete, corrugated metal, or structural plate, that is used to convey flowing water through the construction crossing. Temporary access culvert construction must conform to Section 29.10 of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. Culvert type is dependent upon the type of traffic anticipated over the culvert. The temporary access culverts will be installed where indicated on Design Drawing C-2, an evaluation of required culvert size is provided in Appendix A, and a general temporary access culvert detail is provided on Design Drawing C-5. The access culverts will remain in place until the remedial action is complete and final stabilization is established.

Surface Roughening - NA. The surfaces of regraded areas will be roughened to reduce runoff velocity and to aid in the establishment of vegetative cover. Surface roughening should be performed when rain storms are anticipated.

In-Stream Stone Dike - NA. An in-stream stone dike is a sediment-filtering device used in streams that generally carry stormwater flow. The in-stream stone dike will be constructed to prevent downstream migration of any sediment found in stormwater runoff. The in-stream stone dike will be installed where indicated on Design Drawing C-2. An in-stream stone dike construction detail is provided on Design Drawing C-5. The in-stream stone dike will be removed after all disturbed areas are stabilized.

2.6.2 Management Strategies

- Unstabilized, disturbed areas will be minimized, and construction activities will be staged.
- Seeding or other stabilization measures will be conducted in a staged manner immediately after final grade establishment (i.e., as final grades are established over a portion of the site, that portion will be stabilized).
- Areas that are not to be disturbed will be clearly marked by flags, signs, etc.
- The Contractor's superintendent will be responsible for ensuring the correct installation and maintenance of all erosion and sediment control features.
- Erosion and sediment control features will be installed and/or constructed before the start of any earth-disturbance activities.
- Erosion and sediment control features will remain in place until permanent vegetation is established over disturbed surfaces, as described in the revegetation notes on Design Drawing C-4.
- Erosion and sediment control features will be inspected daily and after each runoff producing rainfall event.

2.7 PERMANENT STABILIZATION

All areas disturbed by remedial action activities, including uplands and non-tidal wetland buffers but not the wetlands themselves, will be stabilized with a permanent seed mixture as soon as possible following final grading but no later than 7 to 14 days (as noted on the Design Drawings). If permanent seeding will not be possible prior to the 7 to 14 days from establishing final grades, temporary seed will be installed immediately after establishing final grades. The permanent seed mixture was selected from the list of Maryland standard seed mixtures in Section 20.0 of the Maryland Standards and Specifications for Soil Erosion and Sediment Control (MDE, 1994). The seed mixture was selected based on the applicable

hardiness zone, level of maintenance, erosion resistance, ecological function, and absence invasive species such as tall fescue (*Festuca arundinacea*).

The permanent seed mixture is based on Mixture 5 in Table 25 (page G-20-18) of the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control. It calls for perennial ryegrass (*Lolium perenne*) seeded at a rate of 20 pounds of pure live seed (PLS) per acre and flatpea (*Lathyrus sylvestris*) seeded at a rate of 20 pounds of PLS per acre. Although these two species are not regionally indigenous and do not provide superior food or cover for wildlife, they are effective at providing effective erosion control and are not as invasive as many of the other species in the seed mixtures recommended by MDE. Mixture 5 is suited for Plant Hardiness Zone 7a, in which NDW-IH is located; it is suited for moist to dry site conditions; is a low-maintenance mixture; and quickly produces a thick, permanent groundcover.

The recommended planting dates for this seed mixture are March 1 through May 15 and August 15 through November 15. The seeding rates, surface preparation, and suggested fertilization/soil amendments are provided on Design Drawing C-4.

Wetland areas will be seeded with a commercial wetland seed mixture in lieu of the seed mixture discussed above. The commercial wetland seed mixture selected will at a minimum include the following:

- At least one obligate wetland (OBL) or facultative wetland (FACW) grass species, at least one OBL or FACW sedge species (*Carex* sp.), at least one OBL or FACW rush species (*Juncus* sp. or *Scirpus* sp.), and at least one OBL or FACW forb (broadleaved herb);
- No species designated as facultative upland (FACU) or upland (UPL);
- No species not originally indigenous to North America; and
- No species generally considered to be invasive, including (but not necessarily limited to) phragmites (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), cattail species (*Typha* sp.), or tall fescue.

Because of the importance of rapidly establishing dense vegetative cover, and because seed mixtures include species of varying rates of germination and growth, the design calls for seeding the mixture at a rate 1.5 times that recommended by the supplier. Unlike the upland and wetland buffer areas, the wetland soils will not be fertilized, limed, or disked. The wetlands will be seeded either between March 1 and May 15 or August 15 and November 15. Ideally, the soil surface will be dry or saturated but not

inundated at the time of seeding. It may be necessary to temporarily dewater the soil surface to allow for seeding and germination.

2.8 STORMWATER RUNOFF CONSIDERATIONS

In accordance with the 2000 Maryland Stormwater Design Manual (MDE, 2000), any development or construction activity disturbing 5,000 square feet or more of earth must comply with the general performance standards for stormwater management. These performance standards are reported in Section 1.2 of the 2000 Maryland Stormwater Design Manual. Because the intent of the Site 42 RAD is to consolidate and cap the landfill material, the construction activity at Site 42 must address and incorporate these general performance standards. The fourteen general performance standards as they appear in the design manual (MDE, 2000) and the steps included in the RAD to achieve the performance standards are as follows:

1. *Site designs shall minimize the generation of stormwater and maximize pervious area for stormwater treatment.* The RAD involves installing a multilayer engineered cap. Although a portion of the engineered cap will have an asphalt surface, the increased impervious area does not affect the peak runoff volumes within the watershed. Pre- and post-construction runoff calculations are provided in Appendix A.
2. *Stormwater runoff generated from development and discharged directly into a jurisdictional wetland or waters of the State of Maryland shall be adequately treated.* Stormwater runoff from Site 42 will discharge to a wetland located south of Site 42. Because of the engineered cap construction and the periodic maintenance, overland runoff is not expected to contain sediment or increase in quantity (see Appendix A for pre- and post-construction stormwater runoff calculations).
3. *Annual groundwater recharge rates shall be maintained by promoting infiltration through the use of structural and non-structural methods. At a minimum, the annual recharge from post-development site conditions shall mimic the annual recharge from pre-development site conditions.* The pre- and post-construction hydrology calculations were performed because the post-construction grades and surface types are different from the pre-construction conditions. Calculations for the pre- and post-construction hydrology are provided in Appendix A.1. Due to the size of Site 42 and because the size of new impervious areas is small, the stormwater runoff associated with the post-construction grades is equal to the stormwater runoff associated with the pre-construction grades.

4. *Water quality management shall be provided through the use of structural and/or non-structural practices. During construction, the erosion and sediment control structures described in Section 2.6 of this report will be used to prevent sedimentation of the wetlands and waterways downgradient of the site. Following cap construction, the site features (vegetation, channels, stabilized channel banks, and shallow slopes) will prevent erosion and transportation of silt to the downgradient wetlands and waterways.*
5. *Structural best management practices (BMPs) used for new development shall be designed to remove 80% of the average annual post development total suspended solids load (TSS) and 40% of the average annual post development total phosphorous load (TP). It is presumed that a BMP complies with this performance standards if it is; sized to capture the prescribed water quality volume (WQv); designed according to the specific performance criteria outlined in the 2000 Maryland Stormwater Design Manual; constructed properly; and maintained regularly. The construction of the engineered cap, along with site restoration, will replace deeply eroded drainage ditches with stabilized slopes that resist erosion. Therefore, the amount of suspended solids in the runoff will be reduced in comparison with existing conditions. Because IW71 is located just south of Site 42, any sediment or suspended solids within the stormwater runoff will be removed prior to continuing downstream. In addition, capping the landfill material will minimize migration of contaminants from the landfill to the groundwater, which discharges to the wetland south and southwest of the landfill.*
6. *On the Eastern Shore the post development peak discharge rate shall not exceed the predevelopment peak discharge rate for the two-year frequency storm event. On the Western Shore, local authorities may require that the post development ten-year peak discharge not exceed the predevelopment peak discharge if the channel protection storage volume (Cpv) is provided (see standard 7). In addition, safe conveyance of the 100-year storm event through stormwater management practices shall be provided. NDW-IH is located on the Western Shore of Maryland (according to Figure 2-4 of the 2000 Maryland Stormwater Design Manual). The pre- and post-construction stormwater runoff calculations are provided in Appendix A. Peak discharge rates for the 2-, 10-, 25-, and 100-year storm events are provided in these calculations.*
7. *To protect stream channels from degradation, Cpv shall be provided by 12 to 24 hours of extended detention storage for the one-year storm event. Cpv shall not be provided for direct discharges to tidal waters and the Eastern Shore of Maryland unless the appropriate approval authority deems it is necessary on a case by case basis. Because the stream that collects runoff from the construction area discharges directly to Mattawoman Creek, which is tidally influenced, Cpv determinations are not required.*

8. *Stormwater discharges to critical areas with sensitive resources [e.g., cold water fisheries, shellfish beds, swimming beaches, recharge areas, water supply reservoirs, Chesapeake Bay Critical Area] may be subject to additional performance criteria or may need to utilize or restrict certain BMPs. Stormwater will be discharged to the wetlands that surround the southern portions of the landfill. However, proper stabilization practices will be used to reduce runoff flow velocity and the transportation of sediment.*
9. *All BMPs shall have an enforceable operation and maintenance agreement to ensure the system functions as designed. During construction, the Contractor is required to maintain the erosion and sediment control features on a daily basis. The Contractor is also required to have available on site, for inspection by authorized officials, the site's approval letter, the approved Erosion and Sediment Control Plan, test reports, and a log of all erosion and sediment control feature inspections. Following construction, other than reestablishing the existing drainage swales and placement of permanent ECM, it is not anticipated that permanent erosion and sediment controls will be required for Site 42.*
10. *Every BMP shall have an acceptable form of water quality pretreatment. As indicated in Standard 5, it is assumed that the BMP will be acceptable as long as it is sized and constructed correctly. Other than stabilizing the existing drainage swales, it is not anticipated that permanent BMPs are required for this project.*
11. *Redevelopment, defined as any construction, alteration, or improvement exceeding 5,000 sf of land disturbance on sites where existing land use is commercial, industrial, institutional or multi-family residential, is governed by special stormwater sizing criteria depending on the amount of increased or decreased impervious area created by redevelopment. The construction of a multilayer engineered cap, along with site restoration, does not meet this definition of redevelopment.*
12. *Certain industrial sites are required to prepare and implement a stormwater pollution prevention plan and file a notice of intent (NOI) under the provision of Maryland's Stormwater Industrial National Pollutant Discharge Elimination System (NPDES) general permit. The requirements for preparing and implementing a stormwater pollution prevention plan are described in the general discharge permit available from MDE and guidance can be found in the USEPA document entitled, "Storm Water Management for Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices" (1992). The stormwater pollution prevention plan requirement applies to both existing and new industrial sites. Because Site 42 is a CERCLA site,*

the NOI, notice of termination (NOT), and NPDES permits are not required as discussed in the Environmental Permits Report; however, the project will comply with the intent of these permits.

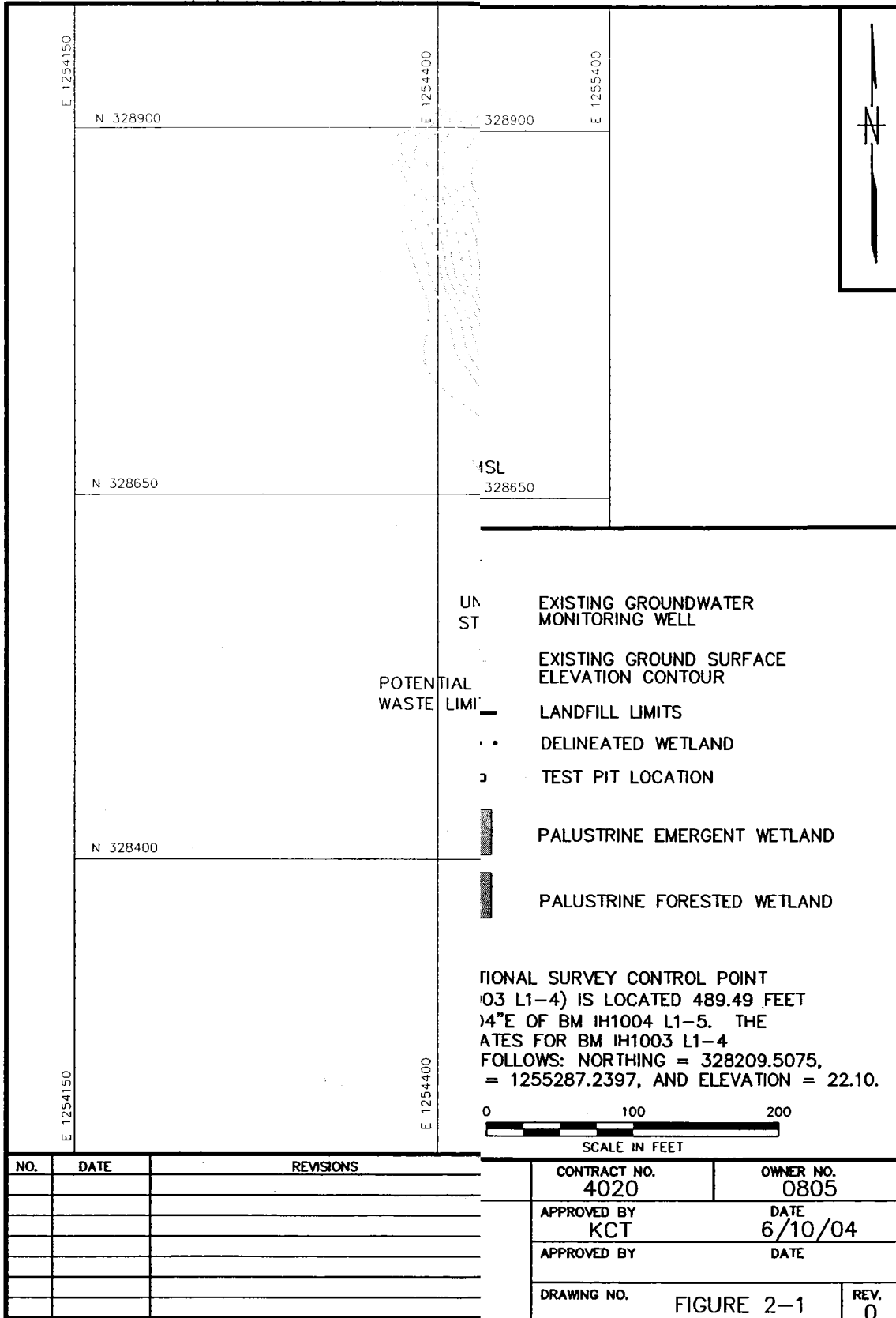
13. *Stormwater discharges from land uses or activities with higher potential for pollutant loadings, defined as hotspots in Chapter 2, may require the use of specific structural BMPs and pollution prevention practices. In addition, stormwater from a hotspot land use may not be infiltrated without proper pretreatment. Site 42 does not meet the definition of a stormwater hotspot. However, the capping of landfill material will remove any potential for contamination that might be migrating from the landfill to the stream through groundwater discharge.*
14. *In Maryland, local governments are usually responsible for most stormwater management review authority. Therefore, prior to design, applicants should always consult with their local reviewing agency to determine if they are subject to additional stormwater design requirements. In addition, certain earth disturbances may require NPDES construction general permit coverage from MDE. Because Site 42 is a CERCLA site, these permits are not required as discussed in the Environmental Permits Report; however, the project will comply with the intent of these permits.*

2.9 MAINTENANCE

In general, all erosion and sediment control facilities will be checked daily and after each runoff producing rainfall event to assure that all erosion and sediment controls remain in effective operating condition. Any required repairs will be made immediately. The following items will be checked:

- The stabilized construction entrances will be maintained in a condition that will minimize tracking sediment onto roads, including the addition of stone or other repairs.
- The super silt fence will be checked daily for undermining or deterioration of the fabric and for fence stability. Sediment will be removed when the level of sediment deposition causes "bulging" or reaches half of the fabric height.
- The silt fence will be checked daily for undermining or deterioration of the fabric and for fence stability. Sediment will be removed when the level of sediment deposition causes "bulging" or reaches half of the fabric height.
- The seeded areas will be checked regularly to ensure that a good stand of vegetation is maintained. Areas will be fertilized and reseeded as needed. The Contractor is responsible for maintenance until formal acceptance by the Contracting Officer and MDE.

- Stone check dams and the in-stream stone dike will be checked for sediment accumulation. Sediment will be removed when it reaches one-half of the original height of the stone check dam or in-stream stone dike. Regular inspections will be made to ensure that the centers of these devices are lower than the edges. Erosion caused by high flows around the edges of these devices will be corrected immediately.
- During the establishment of the drainage swales, repairs will be made immediately and, when required, ECM and grass will be re-established. After grass has been established, the channels will be checked periodically to determine if the grass and associated ECM are withstanding flow velocities without damage.



ACAD: 4020CM18.dwg 06/03/04 DM PIT



SOURCE: SOIL SURVEY OF CHARLES COUNTY, MARYLAND
UNITED STATES DEPARTMENT OF AGRICULTURE
IN COOPERATION WITH
MARYLAND AGRICULTURAL EXPERIMENT STATION
ISSUED JULY 1974


DRAWN BY DM	DATE 6/3/04	 Tetra Tech NUS, Inc.	CONTRACT NO. 4020	OWNER NO. 0805
CHECKED BY TWS	DATE 3/10/05		APPROVED BY KTC	DATE 3/10/05
COST/SCHED-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-2	REV. 0

FIGURE 2-2: SOILS MAP, SITE 42 - OLSEN ROAD LANDFILL, NAVAL DISTRICT WASHINGTON, INDIAN HEAD, MARYLAND

3.0 SEQUENCE OF CONSTRUCTION

The time required to perform construction activities absent work restrictions with other NDW-IH activities is estimated to be 7 months. However, it is anticipated that access to Site 42 will be restricted because of the nature of the NDW-IH activities performed within Buildings 1866 and 3069. Therefore, the time required to perform the construction activities is estimated to be 9 months. The generalized sequence of construction activities is as follows:

1. Hold Pre-construction meeting with the Contracting Officer, MDE, Building 1866 operator, and nearby building operators to establish construction schedule and work restrictions at Site 42.
2. Inspect site prior to construction to verify existing site conditions and underground utility locations.
3. Establish horizontal and vertical control for construction. Stake the locations of all areas to be excavated or disturbed prior to actual work.
4. Relocate communication lines, fire alarm box connection lines, and fire alarm box associated with Building 1866 to the locations indicated on Design Drawing C-13. Relocation of these utilities will be followed by the relocation (by others) of the overhead electrical lines south and southwest of Building 1866.
5. Construct the river water line extension as indicated and install new fire hydrant as indicated on Design Drawing C-13. River water line and fire hydrant construction may proceed prior to relocation of overhead electrical lines (by others). However, continuation with Sequence Item 6 may not occur until all utilities are relocated, all connections have been made, and the removal of the existing overhead electrical lines south and southwest of Building 1866 have been completed.
6. Clear and grub for perimeter erosion and sediment controls only. Install perimeter controls for stabilized construction entrances. Install the stabilized stone construction entrances. Install all remaining perimeter controls, including those required for decontamination pad(s) and excavation areas as indicated on Design Drawing C-2 and the off-site material processing area (i.e., screening area). Perimeter control locations are subject to approval of the Contracting Officer and MDE, and must be approved prior to any earth disturbance activities. All perimeter controls shall conform to standards and specifications identified in the 1994 Maryland standards and specifications for soil erosion and sediment control manual. The perimeter controls to be installed include, but are not limited to, the following:

- Silt fence along the down slope sides of all support facilities (i.e. decontamination pads, stabilized construction entrances, and material processing area);
 - Super silt fence along the toe of slopes;
 - Temporary stream crossings in the drainage ditches located on the southeastern side of the landfill; and
 - Additional controls as may be required by the Contracting Officer and/or warranted by site conditions and best construction practices.
7. Clear and grub construction laydown areas, materials storage and staging areas, access roads, material processing area, and decontamination pads.
 8. Construct laydown areas, materials storage and staging areas, access roads, soil material processing area, decontamination pads, stone check dams, in-stream stone dike and temporary safety/security fence (as necessary).
 9. Clear and grub within the remaining limits of disturbance.
 10. Abandon existing groundwater monitoring wells S42MW02, S42MW04, and S42MW07 in accordance with COMAR 26.04.04.
 11. Excavate area of potential hazardous waste, transport excavated material to the material processing area. Following screening, transport material (including material retained on screens minus munitions and explosives of concern) to an appropriate off-facility treatment, storage, or disposal facility.
 12. Remove landfill material outside the limits of the proposed engineered cap system. Regrade remainder of landfill area to establish the interim grades indicated on Design Drawing C-6. Excess landfill material shall be transported to the material processing area, processed, and disposed as indicated in Sequence of Construction Item 11. During regrading and prior to placing the 6-inch common fill layer, removed sediment from the erosion and sediment control devices and grade with the select landfill material. Following the installation of the 6-inch common fill layer, any sediment removed from the erosion and sediment control devices shall be stockpiled for use as directed by the Contracting Officer.

13. Inspect established interim grade for objects protruding from the prepared surface that could damage the geomembrane. Following Contracting Officer approval of the prepared interim grade, install the grass and bituminous concrete surfaced engineered cap systems. Construction of the engineered cap system includes the construction of gabion walls and reno mattresses.
14. After establishing final grades install additional silt fence, plant permanent vegetation on all disturbed areas, and restore indicated wetlands and the unnamed stream located south and southwest of the site.
15. Install signs along the engineered cap perimeter and install groundwater monitoring wells where indicated.
16. With the approval of the Contracting Officer and MDE remove all temporary facilities (i.e., stabilized construction entrances, access roads, decontamination pad, material, processing area, etc.). Restore and revegetate as needed. When all upstream areas have been stabilized and have been accepted by the Contracting Officer and with the approval of MDE, remove all remaining perimeter controls and stone check dams and immediately stabilize all areas disturbed by the remedial action.

4.0 CONCLUSIONS

This remedial action will result in the improvement of the site over the long term. A multilayered engineered cap will be constructed, potentially hazardous landfill material will be removed, and the disturbed area will be restored. This remedial action will minimize the risks to human health and the environment associated with exposure to buried wastes and contaminated soils and will minimize the migration of contaminants to groundwater via infiltration. In addition, the remedial action will include periodic monitoring of groundwater and groundwater use restrictions to address the contaminant issues with the shallow groundwater. During the remedial action, appropriate steps will be implemented to control runoff from the site and to reduce the impacts of erosion and sedimentation.

Runoff quality during the remedial action will be addressed via temporary erosion and sediment control devices around the perimeter of the disturbed areas.

REFERENCES

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EFA, Chesapeake (Engineering Field Activity, Chesapeake), 2002. Site Management Plan for Installation Restoration Program, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, September.

MDE (Maryland Department of the Environment), 1994, Water Management Administration, Maryland Standards and Specifications for Soil Erosion and Sediment Control.

MDE, 2000, 2000 Maryland Stormwater Design Manual Volumes I & II, Maryland Department of the Environment, Water Management Administration.

NEESA (Naval Energy and Environmental Support Activity), 1992. Supplemental Preliminary Assessment Report, Naval Ordnance Station, Indian Head, Maryland (13-021A).

TtNUS, 1999. Remedial Investigation Report, Site 12 – Town Gut Landfill, Site 39/41 – Organics Plant/Scrap Yard, Site 42 – Olsen Road Landfill, Site 44 – Soak Out Area, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland. King of Prussia, Pennsylvania, July.

TtNUS, 2003. Final Feasibility Study Report for Site 42 – Olsen Road Landfill Revision 3, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, December.

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USDA, 1986. Urban Hydrology for Small Watersheds, Technical Release 55, June.

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USEPA, et al., 2005. Record of Decision Site 42 - Olsen Road Landfill, Naval District Washington, Indian Head, Indian Head, Maryland, U.S. Environmental Protection Agency, Maryland Department of the Environment, and Naval District Washington, Indian Head.

APPENDIX A

HYDROLOGY CALCULATIONS

- A.1 PRE- AND POST-CONSTRUCTION RUNOFF
CALCULATIONS**
- A.2 TEMPORARY ACCESS CULVERT EVALUATION**
- A.3 SILT FENCE/SUPER SILT FENCE EVALUATION**
- A.4 STONE CHECK DAM EVALUATION**

) **A.1 PRE- AND POST-CONSTRUCTION RUNOFF CALCULATIONS**

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - OUTFALL 71 WATERSHED EVALUATION			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: JRM	APPROVED BY:	DATE:
Date: 4-15-04	Date: 4-26-04		

OBJECTIVE:

1. Calculate the 2-, 10-, 25-, and 100-year peak discharge at Outfall 71, located south of Site 42 for pre-construction conditions.
2. Calculate the 2-, 10-, 25-, and 100-year peak discharge at Outfall 71, located south of Site 42 for post-construction conditions.

APPROACH:

1. Delineate the pre- and post- construction drainage areas associated with the Outfall 71 Watershed and measure the surface area with a planimeter.
2. Use the Haestad Method PondPack Version 9.0 computer program to calculate the weighted runoff curve number, time of concentration (T_c), and peak 2-, 10-, 25-, and 100-year discharge for the drainage areas.

REFERENCES:

1. Natural Resources Conservation Service (NRCS), June 1986. *Urban Hydrology for Small Watersheds, Technical Release 55 (TR-55)*.
2. Center for Watershed Protection and the Maryland Department of the Environment (MDE), 2000. *Maryland Stormwater Design Manual*.
3. Soil Conservation Service (SCS), July 1974. *Soil Survey of Charles County, Maryland*.
4. Haestad Method PondPack, Version 9.0.

OUTFALL 71 WATERSHED CALCULATIONS (PRE-CONSTRUCTION CONDITIONS):

1. Drainage Area:

The drainage area (DA) is delineated on Figure 1 provided on page 6 of 22 of this calculation. The drainage area calculations and flow path slope calculations are provided below. With regard to the land covers in the drainage area, the information is presented in the runoff curve number calculations according to soil type and hydrologic soil group (HSG).

2. Runoff Curve Numbers:

Within the watershed, the different types of land cover with respect to soil type and HSG were measured with a planimeter. The PondPack computer program was then used to calculate a weighted runoff curve number for the drainage area. The following tables present the HSGs present in the watershed, the area calculations, and the selected runoff numbers.

Site Soil Types:

Soil Types	Description	Corresponding HSG
Ms	Matawan Loamy Sand	C
Ek	Elkton Silt Loam	C/D
KpA	Keyport Silt Loam (0-2% Slope)	C

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - OUTFALL 71 WATERSHED EVALUATION			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: <i>gxl</i>	APPROVED BY:	DATE:
Date: 4-15-04	Date: 4-26-04		

KpB2	Keyport Silt Loam (2-5% Slope)	C
KpC2	Keyport Silt Loam (5-12% Slope)	C

Discharge Area:

Drawing Scale: 1" = 100 feet

Drainage Area	Soil Type ¹	HSG ²	Surface Description	Planimeter Reading (si)	Area (sf)	Area (ac)	Curve Number ²
Outfall 71 Watershed	Ms	C	Brush/Grass	2.759	27,590	0.63	65
			Woods	9.928	99,280	2.28	72
			Pavement	0.798	7,980	0.18	98
	Ek	C/D	Brush/Grass	8.238	82,380	1.89	69
			Woods	11.741	117,410	2.70	75.5
			Buildings/Pavement	3.651	36,510	0.84	98
	KpC2	C	Woods	6.502	65,020	1.49	72
	KpA	C	Brush/Grass	40.393	403,930	9.27	65
			Woods	5.743	57,430	1.32	72
			Buildings/Pavement	9.416	94,160	2.16	98
	KpB2	C	Brush/Grass	18.313	183,130	4.20	65
			Woods	35.046	350,460	8.05	72
Buildings/Pavement			5.200	52,000	1.19	98	
Total Acres						36.20	

Note: Figure provided on page 6 of 22 is a half-size of the drawing from which area measurements were taken (Figure scale 1" = 200').

¹ Taken from Reference 3

² Taken from Reference 1

The composite CN for Outfall 71 watershed is 73. The CN PondPack printout is provided on page 9 of 22.

3. Time of Concentration:

Four T_c flow paths were evaluated for the Site 42 drainage area. The T_c flow paths are illustrated on page 6 of 22.

The following is a description of the longest T_c flow path for the Site 42 drainage area as calculated by PondPack. T_c calculations use the 2-year 24-hour storm event (3.3 inches, page 8 of 22).

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - OUTFALL 71 WATERSHED EVALUATION			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: <i>gfw</i>	APPROVED BY:	DATE:
Date: 4-15-04	Date: 4-26-04		

Site 42 Drainage Area (Flow path #1, Longest T_c)

Sheet flow begins at an elevation of 37 ft msl and extends 300 ft to elevation 34 ft msl, resulting in an average slope equal to 0.01 ft/ft. The surface description for sheet flow is grass/brush. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient (n) is 0.41 (highest Manning's number for grass). Shallow concentrated flow continues from elevation 34 ft msl and extends 120 ft to elevation 33 ft msl, resulting in an average slope equal to 0.0083 ft/ft. The surface description for shallow concentrated flow is unpaved.

Channel flow begins at elevation 33 ft msl and extends 505 ft to elevation 29 ft msl, resulting in an average slope equal to 0.0079 ft/ft. The channel has a flow area equal to 16 sf, a wetted perimeter of 16.5 ft, and a surface description of natural channels with stones and weeds. According to Table 19.A in the NRCS TR-55 manual, the roughness coefficient (n) is 0.035. Channel flow continues from elevation 29 ft msl and extends 375 ft to an elevation of 20 feet, resulting in an average slope equal to 0.024 ft/ft. The channel has a flow area equal to 10 sf, wetted perimeter of 20.1 ft and a roughness coefficient (n) of 0.035. Flow path #1 ends with channel flow beginning at elevation 20 ft msl and extends 780 ft to elevation 4 ft msl (at outfall IW71), resulting in a slope equal to 0.0205 ft/ft. The channel has a flow area equal to 30 sf, a wetted perimeter of 30.27 ft, and a roughness coefficient (n) of 0.035.

The time of concentration for the flow path described above is 1.26 hours. Channel characteristics (slope, flow area, and wetted perimeter) are provided on page 7 of 22 and the PondPack output data for flow path #1 is provided on pages 10 and 11 of 22.

4. Peak discharge:

The peak discharges for the 2-, 10-, 25-, and 100-year 24-hour storm events under pre-construction conditions were calculated by PondPack. The inputs include the drainage area size, corresponding weighted runoff curve number T_c , as well as the 2-, 10-, 25-, and 100-year precipitation equal to 3.3-inches, 5.3-inches, 5.7-inches, and 7.5-inches respectively (refer to precipitation table provided on page 8 of 22).

CONCLUSIONS:

The following is a summary table of the pre-construction runoff associated with the 2-, 10-, 25-, and 100-year 24-hour storm events calculated for the drainage area at Site 42 - Olsen Road Landfill. The PondPack output data for pre-construction runoff is provided on pages 12 - 15 of 22.

Storm Event	Precipitation (in)	Pre-Construction Runoff (cfs)
2-Year	3.3	15.30
10-Year	5.3	39.90
25-Year	5.7	45.30
100-Year	7.5	70.58

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - OUTFALL 71 WATERSHED EVALUATION			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: JFW	APPROVED BY:	DATE:
Date: 4-15-04	Date: 4-26-04		

OUTFALL 71 WATERSHED CALCULATIONS (POST-CONSTRUCTION CONDITIONS):

Post-construction runoff calculations were performed in the same manner used for the pre-construction runoff calculation presented above. Watershed delineations, surface types, flow paths, and rainfall amounts used for the post-construction runoff calculation are the same as those used in the pre-construction calculation.

Site 42 is located at the southern end of the Outfall 71 Watershed and occupies 1.43 acres of the 36.2 acre watershed. Because the nature of construction will result in regrading the 1.43 acre area of Site 42. The area of the Outfall 71 watershed will remain the same. However, due to the placement of additional asphalt at site 42, the CN for the Outfall 71 watershed will change.

1. Drainage Area:

The drainage area for post-construction conditions is equal to that of the pre-construction conditions (see Figure 1 provided on page 6 of 22).

2. Runoff Curve Numbers:

The soil types and cover conditions for post-construction conditions are the same as those for pre-construction, with the exception of an additional 4,874 sf of asphalt within soil type KpA. The increased asphalt in this area has in turn decreased the amount of brush/grass in soil type KpA. The following table summarizes the changes in discharge area surface types.

Drawing Scale: 1" = 100 feet

Drainage Area	Soil Type ¹	HSG ²	Surface Description	Planimeter Reading (si)	Area (sf)	Area (ac)	Curve Number ²
Outfall 71 Watershed	KpA	C	Brush/Grass	39.906	399,059	9.16	65
			Woods	5.743	57,430	1.32	72
			Buildings/Pavement	9.903	99,034	2.27	98

Note: Figure provided on page 6 of 22 is a half-size of the drawing from which areas measurements were taken (Figure scale 1" = 200').

¹ Taken from Reference 3

² Taken from Reference 1

The composite CN for Outfall 71 watershed under post-construction conditions is 73. The CN PondPack printout is provided on page 16 of 22.

3. Time of Concentration:

The T_c flow path evaluated for post-construction conditions remains unchanged from those evaluated for pre-construction conditions.

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - OUTFALL 71 WATERSHED EVALUATION			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: <i>JNW</i>	APPROVED BY:	DATE:
Date: 4-15-04	Date: 4-26-04		

The time of concentration for the flow path evaluated for post-construction conditions equals 1.26 hours. The PondPack output data for flow path #1 (post-construction conditions) is provided on pages 17 and 18 of 22.

4. Peak Discharge:

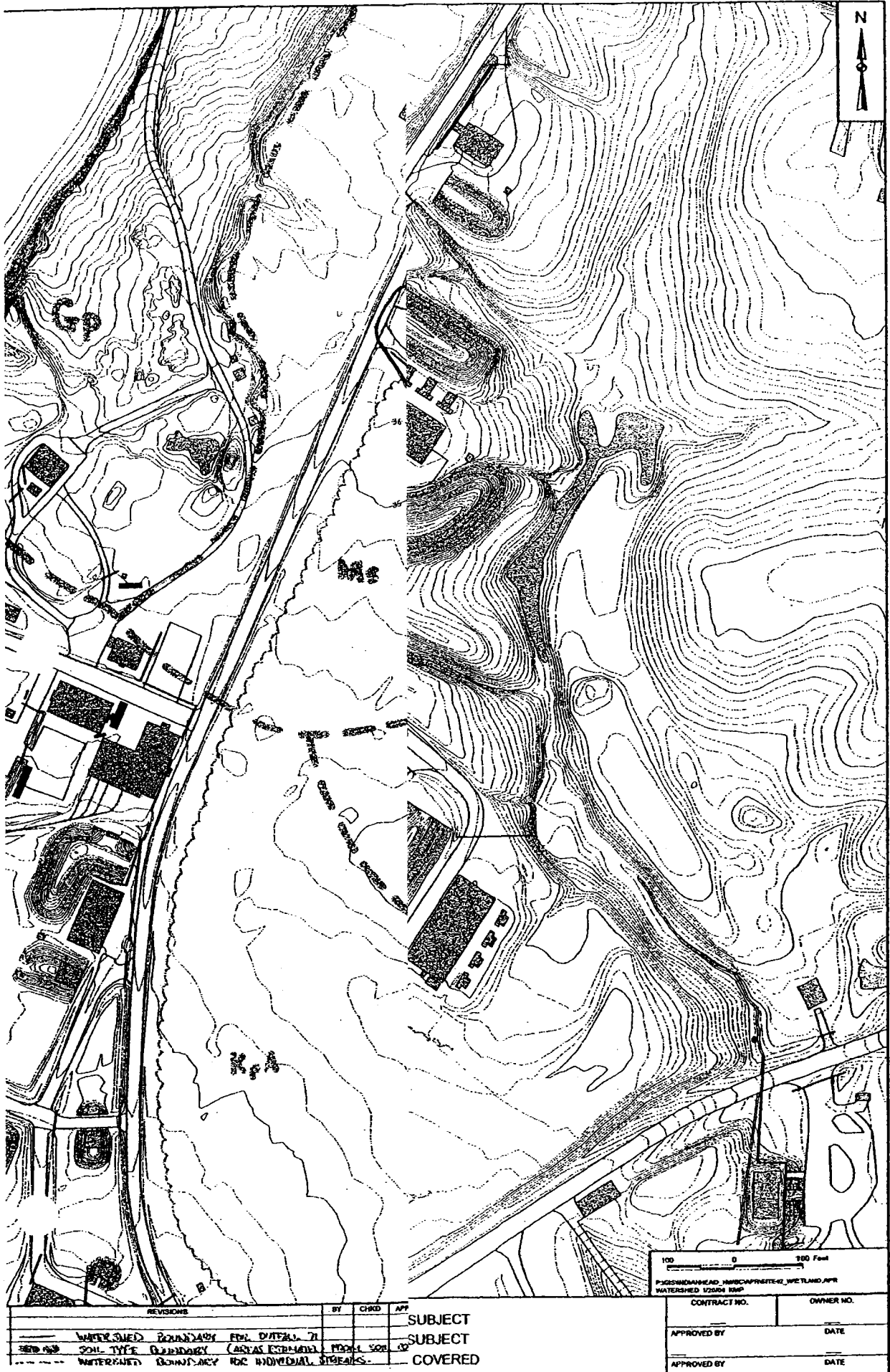
The peak discharges for the 2-, 10-, 25-, and 100-year 24-hour storm events under post-construction conditions were calculated by PondPack. The inputs include the drainage area size, corresponding weighted runoff curve number T_c , as well as the 2-, 10-, 25-, and 100-year precipitation equal to 3.3-inches, 5.3-inches, 5.7-inches, and 7.5-inches respectively (refer to precipitation table provided on page 8 of 22).

CONCLUSIONS:

The following is a summary table of the pre-construction and post-construction runoff associated with the 2-, 10-, 25-, and 100-year 24-hour storm events calculated for the drainage area at Site 42 - Olsen Road Landfill. The PondPack output data for post-construction runoff is provided on pages 19 - 22 of 22.

Storm Event	Precipitation (in)	Pre-Construction Runoff (cfs)	Post-Construction Runoff (cfs)
2-Year	3.3	15.30	15.30
10-Year	5.3	39.90	39.90
25-Year	5.7	45.30	45.30
100-Year	7.5	70.58	70.58

As indicated in the above table, the construction activities will not increase the peak discharge at Outfall 71 for the storms evaluated. Therefore, aside from the permanent structures installed at Site 42 as part of the design, no additional/permanent runoff detention/storage devices are required.

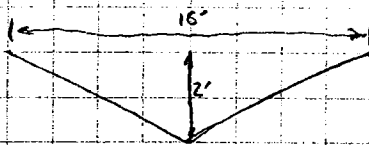


REVISIONS	BY	CHKD	APP	SUBJECT
1. WATERSHED BOUNDARY FOR DITCHES IN				SUBJECT
2. 2011 TYPE BOUNDARY (AS PER KPM) FROM 200				COVERED
3. WATERSHED BOUNDARY FOR INDIVIDUAL STREAMS				

100 0 200 Feet	
PACIFIC NORTHWEST WATERSHED, APR	
WATERSHED 125001 1000	
CONTRACT NO.	OWNER NO.
APPROVED BY	DATE
APPROVED BY	DATE

CLIENT	INDIAN HEAD	JOB NUMBER	4020-1405
SUBJECT	Channel Characteristics for Tc Calculations		
BASED ON	Figure on page 6		DRAWING NUMBER
BY	TWS 4/15/04	CHECKED BY	JLM 4/26/04
APPROVED BY		DATE	

FIRST Channel Section:



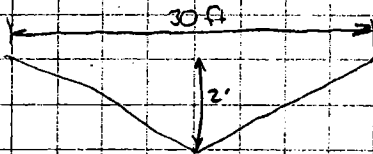
Starting elevation = 33 ft msl
 Ending elevation = 29 ft msl
 Channel length = 505 ft
 Channel Slope = 0.079 ft/ft
 Flow Area = 16 sf
 Wetted Perimeter = 16.5 ft

SECOND CHANNEL SECTION:



Starting Elevation = 29 ft msl
 Ending Elevation = 20 ft msl
 Channel length = 375 ft
 Channel Slope = 0.024 ft/ft
 Flow Area = 10 sf
 Wetted Perimeter = 20.10 ft

THIRD CHANNEL SECTION



Starting Elevation = 20 ft msl
 Ending Elevation = 4 ft msl
 Channel length = 780 ft
 Channel Slope = 0.0205 ft/ft
 Flow Area = 30 sf
 WETTED PERIMETER = 30.27 ft

Chapter 2. Unified Stormwater Sizing Criteria.....Rainfall Depth Chart

Table 2.2 Rainfall Depths Associated with the 1,2,10 and 100-year, 24-hour Storm Events

County	Rainfall Depth				15 _{yr} - 24h
	1 yr - 24 hr	2 yr-24 hr	10 yr-24 hr	100 yr-24 hr	
Allegany	2.4 inches	2.9 inches	4.5 inches	6.2 inches	
Anne Arundel	2.7	3.3	5.2	7.4	
Baltimore	2.6	3.2	5.1	7.1	
Calvert	2.8	3.4	5.3	7.6	
Caroline	2.8	3.4	5.3	7.6	
Carroll	2.5	3.1	5.0	7.1	
Cecil	2.7	3.3	5.1	7.3	
Charles	2.7	3.3	5.3	7.5	5.7
Dorchester	2.8	3.4	5.4	7.8	
Frederick	2.5	3.1	5.0	7.0	
Garrett	2.4	2.8	4.3	5.9	
Harford	2.6	3.2	5.1	7.2	
Howard	2.6	3.2	5.1	7.2	
Kent	2.7	3.3	5.2	7.4	
Montgomery	2.6	3.2	5.1	7.2	
Prince George's	2.7	3.3	5.3	7.4	
Queen Anne's	2.7	3.3	5.3	7.5	
St. Mary's	2.8	3.4	5.4	7.7	
Somerset	2.9	3.5	5.6	8.1	
Talbot	2.8	3.4	5.3	7.6	
Washington	2.5	3.0	4.8	6.7	
Wicomico	2.9	3.5	5.6	7.9	
Worcester	3.0	3.6	5.6	8.1	

Type.... Runoff CN-Area
Name.... PRE-CONSTRUCTION

Page 6.01

Page 9 of 22

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (PRE).PPW

RUNOFF CURVE NUMBER DATA

.....

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C %UC	Adjusted CN
Ms - Brush/Grass - HSG=C	65	.630		65.00
Ms - Woods - HSG=C	72	2.280		72.00
Ms - Pavement - HSG=C	98	.180		98.00
Ek - Brush/Grass - HSG=C/D	69	1.890		69.00
Ek - Woods - HSG=C/D	76	2.700		75.50
Ek - Bldgs/Pavement - HSG=C/D	98	.840		98.00
KpC2 - Woods - HSG=C	72	1.490		72.00
KpA - Brush/Grass - HSG=C	65	9.270		65.00
KpA - Woods - HSG=C	72	1.320		72.00
KpA - Bldgs/Pavement - HSG=C	98	2.160		98.00
KpB2 - Brush/Grass - HSG=C	65	4.200		65.00
KpB2 - Woods - HSG=C	72	8.050		72.00
KpB2 - Bldgs/Pavement - HSG=C	98	1.190		98.00

COMPOSITE AREA & WEIGHTED CN ---> 36.200 72.52 (73)

.....

Type.... Tc Calcs
Name.... PRE-CONSTRUCTION

Page 5.01

Page 10 of 22

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTPALL 71 WATERSHED (PRE).PPW

.....
TIME OF CONCENTRATION CALCULATOR
.....

Segment #1: Tc: TR-55 Sheet

Mannings n .4100
Hydraulic Length 300.00 ft
2yr, 24hr P 3.3000 in
Slope .010000 ft/ft

Avg.Velocity .07 ft/sec

Segment #1 Time: 1.1423 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 120.00 ft
Slope .008300 ft/ft
Unpaved

Avg.Velocity 1.47 ft/sec

Segment #2 Time: .0227 hrs

Segment #3: Tc: TR-55 Channel

Flow Area 16.0000 sq.ft
Wetted Perimeter 16.50 ft
Hydraulic Radius .97 ft
Slope .007900 ft/ft
Mannings n .0350
Hydraulic Length 505.00 ft

Avg.Velocity 3.71 ft/sec

Segment #3 Time: .0378 hrs

Type.... Tc Calcs
Name.... PRE-CONSTRUCTION

Page 5.02

Page 11 of 22

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (PRE).PPW

Segment #4: Tc: TR-55 Channel

Flow Area 10.0000 sq.ft
Wetted Perimeter 20.10 ft
Hydraulic Radius .50 ft
Slope .024000 ft/ft
Mannings n .0350
Hydraulic Length 375.00 ft

Avg.Velocity 4.14 ft/sec

Segment #4 Time: .0252 hrs

Segment #5: Tc: TR-55 Channel

Flow Area 30.0000 sq.ft
Wetted Perimeter 30.27 ft
Hydraulic Radius .99 ft
Slope .020500 ft/ft
Mannings n .0350
Hydraulic Length 780.00 ft

Avg.Velocity 6.06 ft/sec

Segment #5 Time: .0358 hrs

=====
Total Tc: 1.2637 hrs
=====

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (PRE).PPW
 Storm... TypeII 24hr Tag: 2

Page 2.01
 Event: 2 yr

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NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 2

 Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 2 yr

Total Rainfall Depth= 3.3000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	-----	-----	-----
Outfall OUTFALL IW71	JCT	3.159	12.8000	15.30	
PRE-CONSTRUCTION	AREA	3.159	12.8000	15.30	

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (PRE).PPW
 Storm... TypeII 24hr Tag: 10

Page 2.03
 Event: 10 yr

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NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 10

 Data Type, File, ID = Synthetic Storm TypeII 24hr
 Storm Frequency = 10 yr
 Total Rainfall Depth= 5.3000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	-----	-----	-----
Outfall OUTFALL IW71	JCT	7.596	12.6500	39.90	
PRE-CONSTRUCTION	AREA	7.596	12.6500	39.90	

Type.... Executive Summary (Nodes)

Name.... Watershed

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (PRE).PPW

Storm... TypeII 24hr Tag: 25

Page 2.04

Event: 25 yr

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NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 25

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 25 yr

Total Rainfall Depth= 5.7000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	-----	-----	-----
Outfall OUTFALL IW71	JCT	8.572	12.6500	45.30	
PRE-CONSTRUCTION	AREA	8.572	12.6500	45.30	

Type.... Executive Summary (Nodes)

Page 2.05

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Name.... Watershed

Event: 100 yr

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (PRE).PPW

Storm... TypeII 24hr Tag: 100

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 100 yr

Total Rainfall Depth= 7.5000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	-----	-----	-----
Outfall OUTFALL IW71	JCT	13.182	12.6500	70.58	
PRE-CONSTRUCTION	AREA	13.182	12.6500	70.58	

Type.... Runoff CN-Area
Name.... POST-CONST.

Page 6.01

Page 16 of 22

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (POST).PPW

RUNOFF CURVE NUMBER DATA

.....

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Ms - Brush/Grass - HSG=C	65	.630			65.00
Ms - Woods - HSG=C	72	2.280			72.00
Ms - Pavement - HSG=C	98	.180			98.00
Ek - Brush/Grass - HSG=C/D	69	1.890			69.00
Ek - Woods - HSG=C/D	76	2.700			75.50
Ek - Bldgs/Pavement - HSG=C/D	98	.840			98.00
KpC2 - Woods - HSG=C	72	1.490			72.00
KpA - Brush/Grass - HSG=C	65	9.158			65.00
KpA - Woods - HSG=C	72	1.320			72.00
KpA - Bldgs/Pavement - HSG=C	98	2.272			98.00
KpB2 - Brush/Grass - HSG=C	65	4.200			65.00
KpB2 - Woods - HSG=C	72	8.050			72.00
KpB2 - Bldgs/Pavement - HSG=C	98	1.190			98.00

COMPOSITE AREA & WEIGHTED CN ---> 36.200 72.62 (73)

.....

Type.... Tc Calcs
Name.... POST-CONST.

Page 5.01

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File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (POST).PPW

.....
TIME OF CONCENTRATION CALCULATOR
.....

Segment #1: Tc: TR-55 Sheet

Mannings n .4100
Hydraulic Length 300.00 ft
2yr, 24hr P 3.3000 in
Slope .010000 ft/ft

Avg.Velocity .07 ft/sec

Segment #1 Time: 1.1423 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 120.00 ft
Slope .008300 ft/ft
Unpaved

Avg.Velocity 1.47 ft/sec

Segment #2 Time: .0227 hrs

Segment #3: Tc: TR-55 Channel

Flow Area 16.0000 sq.ft
Wetted Perimeter 16.50 ft
Hydraulic Radius .97 ft
Slope .007900 ft/ft
Mannings n .0350
Hydraulic Length 505.00 ft

Avg.Velocity 3.71 ft/sec

Segment #3 Time: .0378 hrs

Type.... Tc Calcs
Name.... POST-CONST.

Page 5.02

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File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (POST).PPW

Segment #4: Tc: TR-55 Channel

Flow Area 10.0000 sq.ft
Wetted Perimeter 20.10 ft
Hydraulic Radius .50 ft
Slope .024000 ft/ft
Mannings n .0350
Hydraulic Length 375.00 ft

Avg.Velocity 4.14 ft/sec

Segment #4 Time: .0252 hrs

Segment #5: Tc: TR-55 Channel

Flow Area 30.0000 sq.ft
Wetted Perimeter 30.27 ft
Hydraulic Radius .99 ft
Slope .020500 ft/ft
Mannings n .0350
Hydraulic Length 780.00 ft

Avg.Velocity 6.06 ft/sec

Segment #5 Time: .0358 hrs

=====
Total Tc: 1.2637 hrs
=====

Type.... Executive Summary (Nodes)

Page 2.01

Page 19 of 22

Name.... Watershed

Event: 2 yr

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (POST).PPW

Storm... TypeII 24hr Tag: 2

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 2

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 2 yr

Total Rainfall Depth= 3.3000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	-----	-----	-----	-----
Outfall OUTFALL IW71	JCT	3.159		12.8000	15.30	
POST-CONST.	AREA	3.159		12.8000	15.30	

Type.... Executive Summary (Nodes)

Page 2.03

Page 20 of 22

Name.... Watershed

Event: 10 yr

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (POST).PPW

Storm... TypeII 24hr Tag: 10

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 10

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 10 yr

Total Rainfall Depth= 5.3000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	-----	-----	-----
Outfall OUTFALL IW71	JCT	7.596	12.6500	39.90	
POST-CONST.	AREA	7.596	12.6500	39.90	

Type.... Executive Summary (Nodes)
Name.... Watershed
File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 OUTFALL 71 WATERSHED (POST).PPW
Storm... TypeII 24hr Tag: 25

Page 2.05
Event: 25 yr

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NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 25

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 25 yr
Total Rainfall Depth= 5.7000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	-----	-----	-----
Outfall OUTFALL IW71	JCT	8.572	12.6500	45.30	
POST-CONST.	AREA	8.572	12.6500	45.30	

Type.... Executive Summary (Nodes)
Name.... Watershed
File.... C:\Program Files\Haestad\PKW\Sample\SITE 42 OUTFALL 71 WATERSHED (POST).PPW
Storm... TypeII 24hr Tag: 100

Page 2.07
Event: 100 yr

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NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 7.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	-----	-----	-----
Outfall OUTFALL IW71	JCT	13.182	12.6500	70.58	
POST-CONST.	AREA	13.182	12.6500	70.58	

A.2 TEMPORARY ACCESS CULVERT EVALUATION

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - TEMPORARY ACCESS CULVERTS			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: JZW	APPROVED BY:	DATE:
Date: 4-26-04	Date: 4-26-04		

OBJECTIVE:

Determine the required minimum flow area for the temporary access culverts located along the access road southeast of Site 42.

APPROACH:

1. Delineate the drainage areas associated with the watershed that will contribute to the two proposed access culverts (Temporary Access Culverts 1 and 2 as indicated on page 7 of 19.
2. Use the Haestad Method PondPack Version 9.0 computer program to calculate the weighted runoff curve number, time of concentration (T_c), and peak 2-year discharge for the drainage areas.
3. Use the Haestad Method FlowMaster Version 7 computer program to calculate the required flow area for the expected peak 10-year discharge from the drainage areas.

REFERENCES:

1. Natural Resources Conservation Service (NRCS), June 1986. *Urban Hydrology for Small Watersheds, Technical Release 55 (TR-55)*.
2. Center for Watershed Protection and the Maryland Department of the Environment (MDE), 2000. *Maryland Stormwater Design Manual*.
3. Soil Conservation Service (SCS), July 1974. *Soil Survey of Charles County, Maryland*.
4. Haestad Method PondPack, Version 9.0.
5. Haestad Method FlowMaster, Version 7.

CALCULATIONS:**Temporary Access Culvert #1****1. Drainage Area:**

The drainage area associated with Temporary Access Culvert 1 is delineated on Figure 1 provided on page 7 of 19 of this calculation. The drainage area calculations and flow path slope calculations are provided below. With regard to the land covers in the drainage area, the information is presented in the runoff curve number calculations according to soil type and hydrologic soil group (HSG).

2. Runoff Curve Numbers:

Within the watershed, the different types of land cover with respect to soil type and HSG were measured with a planimeter. The PondPack computer program was then used to calculate a weighted runoff curve number for the drainage area. The following tables present the HSGs present in the watershed, the area calculations, and the selected runoff numbers.

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - TEMPORARY ACCESS CULVERTS			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS Date: 4-26-04	CHECKED BY: <i>[Signature]</i> Date: 4-26-04	APPROVED BY: DATE:	

Site Soil Types:

Soil Types	Description	Corresponding HSG
KpA	Keyport Silt Loam (0-2% Slope)	C
KpC2	Keyport Silt Loam (5-12% Slope)	C

Discharge Area:

Drawing Scale: 1" = 100 feet

Drainage Area	Soil Type ¹	HSG ²	Surface Description	Planimeter Reading (si)	Area (sf)	Area (ac)	Curve Number ²
Watershed	KpC2	C	Woods	0.132	1,320	0.03	72
	KpA	C	Brush/Grass	7.058	70,580	1.62	65
			Woods	1.070	10,700	0.25	72
			Buildings/Pavement	1.800	18,000	0.41	98
Total Acres						2.31	

Note: Because the exact locations of the temporary access culvert is not known, the runoff calculations conservatively assume a watershed that extends to the unnamed stream into which the evaluated drainage ditch discharges.

¹ Taken from Reference 3

² Taken from Reference 1

The composite CN for the drainage area associated with Temporary Access Culvert 1 is 72. The CN PondPack printout is provided on page 10 of 19.

3. Time of Concentration:

Two T_c flow paths were evaluated for the drainage area contributing to the Access Culvert 1. The T_c flow paths are illustrated on page 7 of 19.

The following is a description of the longest T_c flow path for the drainage area associated with Access Culvert 1 as calculated by PondPack. T_c calculations use the 2-year 24-hour storm event (3.3 inches, page 9 of 19).

Access Culvert 1 Drainage Area (Flow path #2, Longest T_c)

Sheet flow begins at an elevation of 52 ft msl and extends 48 ft to elevation 34 ft msl, resulting in an average slope equal to 0.375 ft/ft. The surface description for sheet flow is grass/brush. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient is 0.41 (highest Manning's number for grass). Sheet flow continues from elevation 34 ft msl and extends 300 ft to elevation 29 ft msl, resulting in an average slope equal to 0.0167 ft/ft. The surface description for sheet flow is grass/brush and has a roughness coefficient of 0.41.

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - TEMPORARY ACCESS CULVERTS			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: <i>gfw</i>	APPROVED BY:	DATE:
Date: 4-26-04	Date: 4-26-04		

Channel flow begins at elevation 29 ft msl and extends 175 ft to invert elevation 23.22 ft msl, resulting in an average slope equal to 0.033 ft/ft. The channel has a flow area equal to 6 sf, a wetted perimeter of 12.17 ft, and a surface description of natural channels good condition. According to Table 19.A in the NRCS TR-55 manual, the roughness coefficient (n) is 0.025. Channel flow continues from invert elevation 23.22 ft msl and extends 38 ft to an invert elevation of 22.49 ft msl, resulting in an average slope equal to 0.019 ft/ft. The channel is an 18 inch diameter reinforced concrete pipe with a flow area equal to 1.77 sf, wetted perimeter of 4.71 ft and a roughness coefficient (n) of 0.016 (concrete with rough joints). Flow path Tc2 ends with channel flow beginning at invert elevation 22.49 ft msl and extends 290 ft to elevation 6 ft msl, resulting in an average slope equal to 0.0568 ft/ft. The channel has a flow area equal to 10 sf, a wetted perimeter of 10.77 ft, and a roughness coefficient (n) of 0.035 (natural channels with stones and weeds).

The time of concentration for the flow path described above is 1.0094 hours. Channel characteristics (slope, flow area, and wetted perimeter) are provided on page 8 of 19 and the PondPack output data for flow path #2 is provided on pages 11 and 12 of 19.

4. Peak discharge:

In accordance with the 2000 Maryland Stormwater Design Manual, temporary drainage facilities shall be designed to handle a 10-year, 24-hour storm event. The peak discharges for the 10-year 24-hour storm events for the water shed associated with access culvert 1 were calculated by PondPack. The inputs include the drainage area size, corresponding weighted runoff curve number T_c , as well as the 10-year precipitation equal to 5.3-inches (refer to precipitation table provided on page 9 of 19).

The peak runoff associated with the 10-year, 24-hour storm event equals 2.89 cubic feet /second (cfs). The PondPack output for the 10-year storm event is provided on page 13 of 19.

5. Culvert Size:

Haestad Methods FlowMaster computer program is used to calculate the flow area required to convey the expected 10-year, 24-hour peak runoff. Using the slope of the culvert, culvert material type, culvert diameter, and expected flow, the program will provide the depth of flow within the culvert.

In accordance with the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control, page H-29-12A, the minimum culvert diameter allowed for temporary access culverts is 12 inches. This diameter of pipe will be checked in FlowMaster for adequacy. In the event that the minimum diameter is not adequate, the FlowMaster data will be used to select the appropriate size culvert for the temporary access culvert. The FlowMaster output is presented on page 14 of 19.

Culvert Slope at Proposed Location = 0.05 ft/ft
 Culvert Material Type = Concrete
 Mannings coefficient = 0.013
 Discharge Flow = 2.89 cfs
 Diameter of Culvert = 12 inches

Depth of flow in Culvert using FlowMaster = 0.42 feet

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - TEMPORARY ACCESS CULVERTS			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: <i>JRW</i>	APPROVED BY:	DATE:
Date: 4-26-04	Date: 4-26-04		

Temporary Access Culvert #2

1. Drainage Area:

The drainage area associated with Temporary Access Culvert 2 is delineated on Figure 1 provided on page 7 of 19 of this calculation. The drainage area calculations and flow path slope calculations are provided below. With regard to the land covers in the drainage area, the information is presented in the runoff curve number calculations according to soil type and hydrologic soil group (HSG).

2. Runoff Curve Numbers:

Within the watershed, the different types of land cover with respect to soil type and HSG were measured with a planimeter. The PondPack computer program was then used to calculate a weighted runoff curve number for the drainage area. The following tables present the HSGs present in the watershed, the area calculations, and the selected runoff numbers.

Site Soil Types:

Soil Types	Description	Corresponding HSG
KpA	Keyport Silt Loam (0-2% Slope)	C
KpC2	Keyport Silt Loam (5-12% Slope)	C

Discharge Area:

Drawing Scale: 1" = 100 feet

Drainage Area	Soil Type ¹	HSG ²	Surface Description	Planimeter Reading (si)	Area (sf)	Area (ac)	Curve Number ²
Watershed	KpC2	C	Woods	0.155	1,550	0.04	72
	KpA	C	Brush/Grass	2.093	20,930	0.48	65
			Woods	0.992	9,920	0.23	72
			Buildings/Pavement	4.091	40,910	0.94	98
Total Acres						1.69	

Note: Because the exact locations of the temporary access culvert is not known, the runoff calculations conservatively assume a watershed that extends to the unnamed stream into which the evaluated drainage ditch discharges.

¹ Taken from Reference 3

² Taken from Reference 1

The composite CN for the drainage area associated with Temporary Access Culvert 2 is 84. The CN PondPack printout is provided on page 15 of 19.

3. Time of Concentration:

Two T_c flow paths were evaluated for the drainage area contributing to the Access Culvert 2. The T_c flow paths are illustrated on page 7 of 19.

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - TEMPORARY ACCESS CULVERTS			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: <i>JTW</i>	APPROVED BY:	DATE:
Date: 4-26-04	Date: 4-26-04		

The following is a description of the longest Tc flow path for the drainage area associated with Access Culvert 2 as calculated by PondPack. Tc calculations use the 2-year 24-hour storm event (3.3 inches, page 9 of 19).

Access Culvert 2 Drainage Area (Flow path #1, Longest Tc)

Sheet flow begins at an elevation of 30.5 ft msl and extends 155 ft to elevation 29.5 ft msl, resulting in an average slope equal to 0.006 ft/ft. The surface description for sheet flow is grass/brush. According to Table 3-1 in the NRCS TR-55 manual, the roughness coefficient is 0.41 (highest Manning's number for grass). Shallow concentrated flow begins at an elevation of 29.5 ft msl and extends 210 ft to elevation 22 ft msl, resulting in an average slope equal to 0.036 ft/ft. The surface description is paved. Shallow concentrated flow continues from an elevation of 22 ft msl and extends 20 feet to an elevation of 20 ft msl, resulting in an average slope equal to 0.10 ft/ft. The surface description is unpaved.

Flow path Tc1 ends with channel flow that begins at elevation 20 ft msl and extends 210 ft to an elevation of 6 ft msl, resulting in an average slope equal to 0.067 ft/ft. The channel has a flow area equal to 15 sf, a wetted perimeter of 30.07 ft, and a surface description of natural channels good condition. According to Table 19.A in the NRCS TR-55 manual, the roughness coefficient (n) is 0.025.

The time of concentration for the flow path described above is 0.848 hours. Channel characteristics (slope, flow area, and wetted perimeter) are provided on page 8 of 19 and the PondPack output data for flow path #1 is provided on pages 16 and 17 of 19.

4. Peak discharge:

In accordance with the 2000 Maryland Stormwater Design Manual, temporary drainage facilities shall be designed to handle a 10-year, 24-hour storm event. The peak discharges for the 10-year 24-hour storm events for the water shed associated with access culvert 2 were calculated by PondPack. The inputs include the drainage area size, corresponding weighted runoff curve number T_c , as well as the 10-year precipitation equal to 5.3-inches (refer to precipitation table provided on page 9 of 19).

The peak runoff associated with the 10-year, 24-hour storm event equals 3.55 cfs. The PondPack output for the 10-year storm event is provided on page 18 of 19.

5. Culvert Size:

Haestad Methods FlowMaster computer program is used to calculate the flow area required to convey the expected 10-year, 24-hour peak runoff. Using the slope of the culvert, culvert material type, culvert diameter, and expected flow, the program will provide the depth of flow within the culvert.

In accordance with the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control, page H-29-12A, the minimum culvert diameter allowed for temporary access culverts is 12 inches. This diameter of pipe will be checked in FlowMaster for adequacy. In the event that the minimum diameter is not adequate, the FlowMaster data will be used to select the appropriate size culvert for the temporary access culvert. The FlowMaster output is presented on page 19 of 19.

CLIENT: NAVAL DISTRICT WASHINGTON, INDIAN HEAD		JOB NUMBER: 4020-1405	
SUBJECT: SITE 42 - OLSEN ROAD LANDFILL - TEMPORARY ACCESS CULVERTS			
BASED ON: PondPack (TR-55)		DRAWING NUMBER:	
BY: TWS	CHECKED BY: <i>JFW</i>	APPROVED BY:	DATE:
Date: 4-26-04	Date: 4-26-04		

Culvert Slope at Proposed Location = 0.067 ft/ft
Culvert Material Type = Concrete
Mannings coefficient = 0.013
Discharge Flow = 3.55 cfs
Diameter of Culvert = 12 inches

Depth of flow in Culvert using FlowMaster = 0.43 feet

CONCLUSION

The minimum culvert diameter specified in the 1994 Maryland Standards and Specifications for Erosion and Sediment Control (12-inches) will have a maximum flow depths of 0.45 feet (Access Culvert 1) and 0.43 feet (Access Culvert 2) during the peak flow that results from a 10-year, 24-hour storm event. Therefore the minimum culvert diameters will adequately convey the required flow volumes.

Note: Calculations are based on the use of concrete culverts for both temporary access culverts. If the contractor elects to use another culvert material the FlowMaster evaluations should be re-evaluated.



BY	DATE
BY	DATE
SCHEDULE-AREA	
SCALE	
S NOTED	



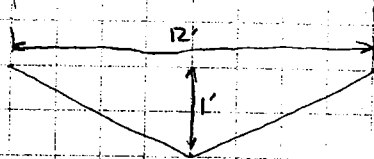
Tetra Tech NUS, Inc.

MAJOR SUBJECT
 MINOR SUBJECT
 SUBJECT COVERED
 CLIENT NAME
 PROJECT LOCATION

CLIENT	INDIAN HEAD		JOB NUMBER	4020 - 1405	
SUBJECT	Channel Characteristics for T_c Calculations				
BASED ON	FIGURE ON PAGE 7		DRAWING NUMBER		
BY	TWS	4/20/04	CHECKED BY	JLM	4/26/04
			APPROVED BY	DATE	

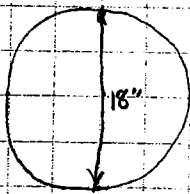
DRAINAGE AREA 1

Channel Segment #1



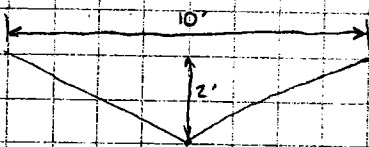
Starting Elevation	=	29 ft msl
Ending Elevation	=	23.22 ft msl
Channel Length	=	175 ft
Channel Slope	=	0.033 ft/ft
Flow Area	=	6 sf
Wetted Perimeter	=	12.17 ft

Channel Segment #2



Starting Elevation	=	23.22 ft msl
Ending Elevation	=	22.49 ft msl
Channel Length	=	38 ft
Channel Slope	=	0.019 ft/ft
Flow Area	=	1.77 ft ²
Wetted Perimeter	=	4.71 ft

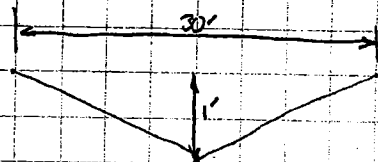
Channel Segment #3



Starting Elevation	=	22.49 ft msl
Ending Elevation	=	6 ft msl
Channel Length	=	290 ft
Channel Slope	=	0.0568 ft/ft
Flow Area	=	10 ft ²
Wetted Perimeter	=	10.77 ft

DRAINAGE AREA 2

Channel Segment #1



Starting Elevation	=	20 ft msl
Ending Elevation	=	6 ft msl
Channel Length	=	210 ft
Channel Slope	=	0.067 ft/ft
Flow Area	=	13 ft ²
Wetted Perimeter	=	30.07 ft

Chapter 2. Unified Stormwater Sizing Criteria.....Rainfall Depth Chart

Table 2.2 Rainfall Depths Associated with the 1,2,10 and 100-year, 24-hour Storm Events

County	Rainfall Depth			
	1 yr - 24 hr	2 yr-24 hr	10 yr-24 hr	100 yr-24 hr
Allegany	2.4 inches	2.9 inches	4.5 inches	6.2 inches
Anne Arundel	2.7	3.3	5.2	7.4
Baltimore	2.6	3.2	5.1	7.1
Calvert	2.8	3.4	5.3	7.6
Caroline	2.8	3.4	5.3	7.6
Carroll	2.5	3.1	5.0	7.1
Cecil	2.7	3.3	5.1	7.3
Charles	2.7	3.3	5.3	7.5
Dorchester	2.8	3.4	5.4	7.8
Frederick	2.5	3.1	5.0	7.0
Garrett	2.4	2.8	4.3	5.9
Harford	2.6	3.2	5.1	7.2
Howard	2.6	3.2	5.1	7.2
Kent	2.7	3.3	5.2	7.4
Montgomery	2.6	3.2	5.1	7.2
Prince George's	2.7	3.3	5.3	7.4
Queen Anne's	2.7	3.3	5.3	7.5
St. Mary's	2.8	3.4	5.4	7.7
Somerset	2.9	3.5	5.6	8.1
Talbot	2.8	3.4	5.3	7.6
Washington	2.5	3.0	4.8	6.7
Wicomico	2.9	3.5	5.6	7.9
Worcester	3.0	3.6	5.6	8.1

Type.... Runoff CN-Area
Name.... DA-1

Page 6.01

Page 10 of 19

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 TEMP ACCESS CULVERT 1.PPW

RUNOFF CURVE NUMBER DATA

.....

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C %UC	Adjusted CN
KpC2 - Woods - HSG=C	72	.030		72.00
KpA - Brush/Grass - HSG=C	65	1.620		65.00
KpA - Woods - HSG=C	72	.250		72.00
KpA - Bldgs/Pavement - HSG=C	98	.410		98.00

COMPOSITE AREA & WEIGHTED CN ---> 2.310 71.71 (72)

.....

Type.... Tc Calcs
Name.... DA-1

Page 5.01

Page 11 of 19

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 TEMP ACCESS CULVERT 1.PPW

.....
TIME OF CONCENTRATION CALCULATOR
.....

Segment #1: Tc: TR-55 Sheet

Mannings n .4100
Hydraulic Length 48.00 ft
2yr, 24hr P 3.3000 in
Slope .375000 ft/ft

Avg.Velocity .22 ft/sec

Segment #1 Time: .0619 hrs

Segment #2: Tc: TR-55 Sheet

Mannings n .4100
Hydraulic Length 300.00 ft
2yr, 24hr P 3.3000 in
Slope .016700 ft/ft

Avg.Velocity .09 ft/sec

Segment #2 Time: .9304 hrs

Segment #3: Tc: TR-55 Channel

Flow Area 6.0000 sq.ft
Wetted Perimeter 12.17 ft
Hydraulic Radius .49 ft
Slope .033000 ft/ft
Mannings n .0250
Hydraulic Length 175.00 ft

Avg.Velocity 6.76 ft/sec

Segment #3 Time: .0072 hrs

Type.... Tc Calcs
Name.... DA-1

Page 5.02

Page 12 of 19

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 TEMP ACCESS CULVERT 1.PPW

Segment #4: Tc: TR-55 Channel

Flow Area 1.7700 sq.ft
Wetted Perimeter 4.71 ft
Hydraulic Radius .38 ft
Slope .019000 ft/ft
Mannings n .0160
Hydraulic Length 38.00 ft

Avg.Velocity 6.68 ft/sec

Segment #4 Time: .0016 hrs

Segment #5: Tc: TR-55 Channel

Flow Area 10.0000 sq.ft
Wetted Perimeter 10.77 ft
Hydraulic Radius .93 ft
Slope .056800 ft/ft
Mannings n .0350
Hydraulic Length 290.00 ft

Avg.Velocity 9.66 ft/sec

Segment #5 Time: .0083 hrs

=====
Total Tc: 1.0094 hrs
=====

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 TEMP ACCESS CULVERT 1.PPW
 Storm... TypeII 24hr Tag: 10

Page 2.03

Event: 10 yr

Page 13 of 19

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 10

 Data Type, File, ID = Synthetic Storm TypeII 24hr
 Storm Frequency = 10 yr
 Total Rainfall Depth= 5.3000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
DA-1	AREA	.468	12.5000	2.89	
Outfall TEMP. CULVERT 1	JCT	.468	12.5000	2.89	

**Temporary Access Culvert #1
Worksheet for Circular Channel**

Page 14 of 19

Project Description	
Worksheet	Access Culvert
Flow Element	Circular Chann
Method	Manning's For
Solve For	Channel Depth

Input Data	
Mannings Coeffic	0.013
Channel Slope	050000 ft/ft
Diameter	12.0 in
Discharge	2.89 cfs

Results	
Depth	0.42 ft
Flow Area	0.3 ft ²
Wetted Perime	1.40 ft
Top Width	0.00 ft
Critical Depth	0.73 ft
Percent Full	41.7 %
Critical Slope	0.008465 ft/ft
Velocity	9.33 ft/s
Velocity Head	1.35 ft
Specific Energ	1.77 ft
Froude Numbe	2.94
Maximum Disc	8.57 cfs
Discharge Full	7.97 cfs
Slope Full	0.006581 ft/ft
Flow Type	supercritical

Type.... Runoff CN-Area
Name.... DA-2

Page 6.01

Page 15 of 19

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 TEMP ACCESS CULVERT 2.PPW

RUNOFF CURVE NUMBER DATA

.....

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
KpC2 - Woods - HSG=C	72	.040			72.00
KpA - Brush/Grass - HSG=C	65	.480			65.00
KpA - Woods - HSG=C	72	.230			72.00
KpA - Bldgs/Pavement - HSG=C	98	.940			98.00

COMPOSITE AREA & WEIGHTED CN ---> 1.690 84.47 (84)

.....

Type.... Tc Calcs
Name.... DA-2

Page 5.01

Page 16 of 19

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 TEMP ACCESS CULVERT 2.PPW

.....
TIME OF CONCENTRATION CALCULATOR
.....

Segment #1: Tc: TR-55 Sheet

Mannings n .4100
Hydraulic Length 155.00 ft
2yr, 24hr P 3.3000 in
Slope .006000 ft/ft

Avg.Velocity .05 ft/sec

Segment #1 Time: .8262 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 210.00 ft
Slope .036000 ft/ft
Paved

Avg.Velocity 3.86 ft/sec

Segment #2 Time: .0151 hrs

Segment #3: Tc: TR-55 Shallow

Hydraulic Length 20.00 ft
Slope .100000 ft/ft
Unpaved

Avg.Velocity 5.10 ft/sec

Segment #3 Time: .0011 hrs

Type.... Tc Calcs
Name.... DA-2

Page 5.02

Page 17 of 19

File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 TEMP ACCESS CULVERT 2.PPW

Segment #4: Tc: TR-55 Channel

Flow Area 15.0000 sq.ft
Wetted Perimeter 30.07 ft
Hydraulic Radius .50 ft
Slope .067000 ft/ft
Mannings n .0250
Hydraulic Length 210.00 ft

Avg.Velocity 9.70 ft/sec

Segment #4 Time: .0060 hrs

Total Tc: .8484 hrs
=====

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... C:\Program Files\Haestad\PPKW\Sample\SITE 42 TEMP ACCESS CULVERT 2.PPW
 Storm... TypeII 24hr Tag: 10

Page 2.03

Event: 10 yr

Page 18 of 19

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Indian Head

Storm Tag Name = 10

 Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 10 yr

Total Rainfall Depth= 5.3000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
DA-2	AREA	.499	12.3500	3.55	
Outfall TEMP. CULVERT 2	JCT	.499	12.3500	3.55	

Temporary Access Culvert #2
Worksheet for Circular Channel

Page 14 of 14

Project Description	
Worksheet	Access Culvert
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data	
Mannings Coeff	0.013
Channel Slope	066667 ft/ft
Diameter	12.0 in
Discharge	3.55 cfs

Results	
Depth	0.43 ft
Flow Area	0.3 ft²
Wetted Perime	1.43 ft
Top Width	0.00 ft
Critical Depth	0.80 ft
Percent Full	43.1 %
Critical Slope	0.010276 ft/ft
Velocity	10.96 ft/s
Velocity Head	1.87 ft
Specific Energ	2.30 ft
Froude Numbe	3.38
Maximum Disc	9.90 cfs
Discharge Full	9.20 cfs
Slope Full	0.009929 ft/ft
Flow Type	supercritical

A.3 SILT FENCE/SUPER SILT FENCE EVALUATION

CLIENT: IHDIV-NSWC, Indian Head, Maryland		JOB NUMBER: 4020-1404	
SUBJECT: Silt and Super Silt Fence Evaluation			
BASED ON:		DRAWING NUMBER:	
BY: T.W.S.	CHECKED BY: J.W.	APPROVED BY: DATE:	
Date: 08/19/03	Date: 9-29-03		

OBJECTIVE:

To properly locate and determine the type of silt fence to intercept and detain sediment in stormwater runoff from disturbed areas during earth disturbance activities at Site 42, and provide protection for the wetland area to which the site drains.

APPROACH:

- 1) Locate and determine the type of silt fence required according to Section 15 (Standards and Specifications for Silt Fence) and Section 26 (Standards and Specifications for Super Silt Fence), Maryland Standards and Specifications for Soil Erosion and Sediment Control, 1994.

REFERENCES:

- 1) Maryland Standards and Specifications for Soil Erosion and Sediment Control, Maryland Department of Environment, Water Management Administration, 1994.

CALCULATIONS:

According to Section 15 and 26 of the Maryland Standards and Specifications for Soil Erosion and Sediment Control, 1994 (Reference 1), no formal design is required. However, slope, slope steepness, and slope length affect the size and placement of silt fence. The following is a summary of design recommendations and guidelines for placement of silt fence and super silt fence:

Silt Fence:

- 1) Silt fence should be placed on or parallel to contours.
- 2) Length of silt fence must conform to the design criteria presented on page 5 of 6 of this calculation.
- 3) Downslope of the silt fence should be undisturbed ground.
- 4) Construction specifications will conform with those identified in Section 15 of Reference 1.

Super Silt Fence:

- 1) Super silt fence should be placed as close to the contour as possible.
- 2) No section of super silt fence should exceed a grade of 5% for a distance of more than 50-feet.
- 3) Length of super silt fence must conform to the design criteria presented on page 6 of 6 of this calculation.
- 4) Construction specifications will conform with those identified in Section 26 of Reference 1.

SLOPE MEASUREMENTS (Preconstruction):

Measurements taken from attached drawing on page 3 of 6.

Slope	Slope Length (ft)	Average Slope (H:V)		Required Fencing
		Max.	Min.	
A	140	4:1	17:1	Super Silt Fence
B	180	4:1	12:1	Super Silt Fence
C	120	7:1	15:1	Super Silt Fence

CLIENT: IHDIV-NSWC, Indian Head, Maryland		JOB NUMBER: 4020-1404	
SUBJECT: Silt and Super Silt Fence Evaluation			
BASED ON:		DRAWING NUMBER:	
BY: T.W.S.	CHECKED BY: JAL	APPROVED BY:	DATE:
Date: 08/19/03	Date: 9-29-03		

SLOPE MEASUREMENTS (Post Construction):

Measurements taken from attached drawing on page 4 of 6.

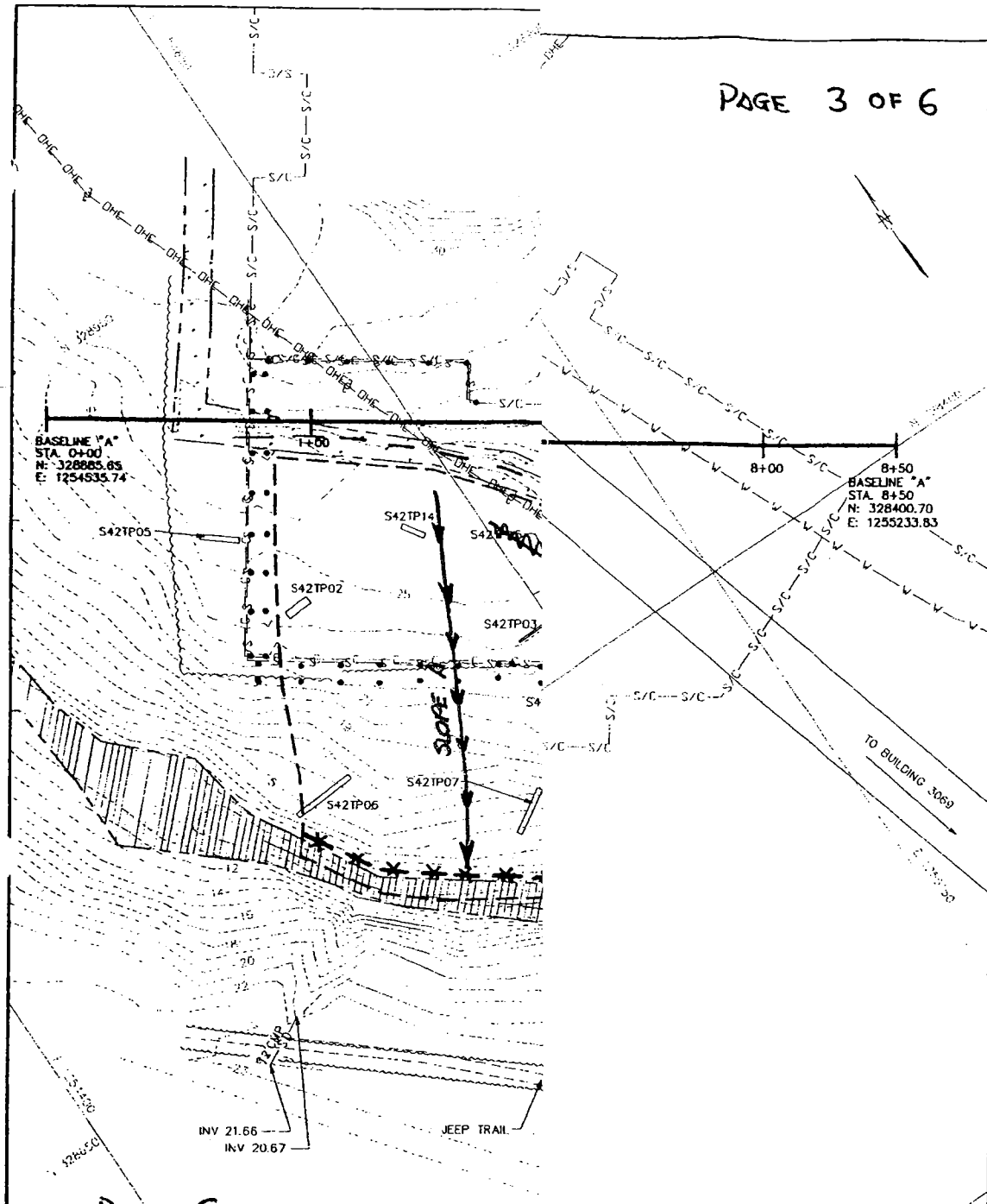
Slope	Slope Length (ft)	Average Slope (H:V)		Required Fencing
		Max.	Min.	
A	80	10:1	40:1	Silt Fence
B	140	10:1	80:1	Silt Fence
C	50	5:1	5:1	Silt Fence
D	65	7:1	10:1	Silt Fence
E	55	5:1	5:1	Silt Fence

CONCLUSION

Silt fence and super silt fence shall be utilized at Site 42 to intercept and detain sediment from upgradient disturbed areas. Super silt fence will provide the primary protection for the downgradient wetlands and water ways, and silt fence will be used as interim measures as excavation and restoration is completed.

The proposed sequence has the landfill debris below the steam lines and north of the steam lines being excavated first. These areas would then be restored to final grade and seeded. To protect these areas silt fence will be installed below the completed sections of work as excavation extends south and south west of the steam lines.

Super silt fence will be adequate to protect the stream south and south west of Site 42 until the remediation extends into the stream. As excavation approaches and extends into the stream, the super silt fence will be removed and replaced with temporary erosion control matting and stone check dams within the stream.



PRE - CONSTRUCTION

MIN

SLOPE A 0.0538 ft/ft
 SLOPE B 0.086 ft/ft
 SLOPE C 0.129 ft/ft

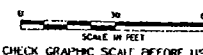
*** PROPOSED SUPER SIL

LEGEND:

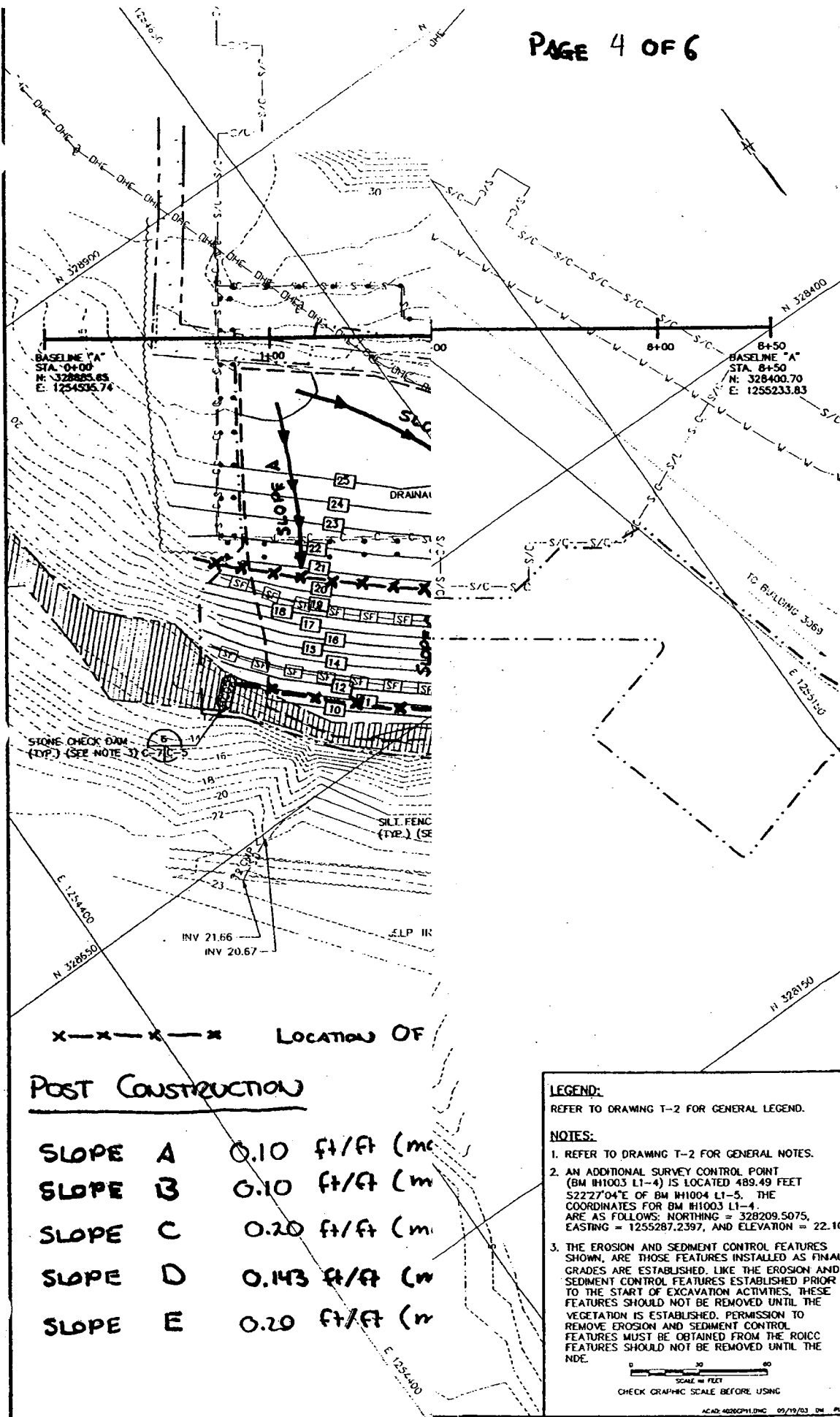
REFER TO DRAWING T-2 FOR GENERAL LEGEND.

NOTES:

1. REFER TO DRAWING T-2 FOR GENERAL NOTES.
2. AN ADDITIONAL SURVEY CONTROL POINT (BM IH1003 L1-4) IS LOCATED 489.49 FEET S22°27'04"E OF BM IH1004 L1-5. THE COORDINATES FOR BM IH1003 L1-4 ARE AS FOLLOWS: NORTHING = 328209.5075, EASTING = 1255287.2397, AND ELEVATION = 22.10.



DEPARTMENT OF THE NAVY ENGINEERING FIELD ACTIVITY-CHESAPEAKE NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.		NAVY HEADQUARTERS NAVY HEADQUARTERS NAVY HEADQUARTERS	
CODE I.D. NO. 80091 DRAWING SIZE: D CONST. CONT. NO. N62170-97-D-XXXX SPEC. 21-97-KYAR-XXXX NAVFAC DRAWING NO.		SHEET 3 OF 12 C-1	
TITLE SUBMITTED BY PROGRAM MANAGER APPROVED (ITD FOR COMMANDER NAVFAC)		SHEET NO. 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000	



ENGINEERING FIELD ACTIVITY-CHESAPEAKE DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.		CODE ID. NO. 80091 DRAWING SIZE: D CONST. CONT. NO. NS2470-97-D-XXXX SPEC. 21-97-XXXX-XXXX NAVFAC DRAWING NO.
PROGRESS (65%) SUBMISSION SITE 42 - OLSEN ROAD LANDFILL REMEDIAL ACTION DESIGN FINAL GRADING PLAN		SHEET 9 OF 12 C-7
DATE: 05/10/03 TIME: 10:00 AM BY: [Signature] CHECKED BY: [Signature] APPROVED BY: [Signature]	DATE: 05/10/03 TIME: 10:00 AM BY: [Signature] CHECKED BY: [Signature] APPROVED BY: [Signature]	DATE: 05/10/03 TIME: 10:00 AM BY: [Signature] CHECKED BY: [Signature] APPROVED BY: [Signature]
REVISIONS		REVISIONS

SILT FENCE

Silt Fence Design Criteria

<u>Slope Steepness</u>	<u>(Maximum) Slope Length</u>	<u>(Maximum) Silt Fence Length</u>
Flatter than 50:1	unlimited	unlimited
50:1 to 10:1	125 feet	1,000 feet
10:1 to 5:1	100 feet	750 feet
5:1 to 3:1	60 feet	500 feet
3:1 to 2:1	40 feet	250 feet
2:1 and steeper	20 feet	125 feet

Note: In areas of less than 2% slope and sandy soils (USDA general classification system, soil Class A) maximum slope length and silt fence length will be unlimited. In these areas a silt fence may be the only perimeter control required.

SUPER SILT FENCE

Design Criteria

<u>Slope</u>	<u>Slope Steepness</u>	<u>Slope Length (maximum)</u>	<u>Silt Fence Length (maximum)</u>
0 - 10%	0 - 10:1	Unlimited	Unlimited
10 - 20%	10:1 - 5:1	200 feet	1,500 feet
20 - 33%	5:1 - 3:1	100 feet	1,000 feet
33 - 50%	3:1 - 2:1	100 feet	500 feet
50% +	2:1 +	50 feet	250 feet

A.4 STONE CHECK DAM EVALUATION

CLIENT: IHDIV-NSWC, Indian Head, Maryland		JOB NUMBER: 4020-1404	
SUBJECT: Stone Check Dam Evaluation			
BASED ON:		DRAWING NUMBER:	
BY: T.W.S.	CHECKED BY: <i>fxw</i>	APPROVED BY:	DATE:
Date: 08/22/03	Date: 9-29-03		

OBJECTIVE:

To determine the spacing of stone check dams in the streams and drainage swales located within and adjacent to the limits of Site 42.

REFERENCES:

- 1) Maryland Standards and Specifications for Soil Erosion and Sediment Control, Maryland Department of Environment, Water Management Administration, 1994.

EVALUATION AND CALCULATIONS:

According to Section 8 of the Maryland Standards and Specifications for Soil Erosion and Sediment Control, 1994 (Reference 1), stone check dams are constructed to reduce runoff velocities to non-erosive rates and to prevent channel erosion in drainage courses.

DESIGN CRITERIA

- 1) Stone check dams shall be located to provide maximum velocity reduction of runoff. The check dams should be placed in reasonable straight ditch sections to minimize erosion at channel bends. All stone check dams shall be keyed into the sides and bottom of the channel in which it is placed. Stone check dams shall not be used as sediment trapping devices.
- 2) The distance between the stone check dams will vary with average ditch slope. Stone check dams will be constructed using 4-inch to 7-inch stone, or recycled concrete equivalent, placed to form a weir. The top of outlet crest of the stone weir shall be approximately 6-inches lower than the outer edges. The upstream side of the stone check dam shall be lined with a 1-foot thick layer of washed crushed aggregate (3/4-inch to 1 1/2-inch in size).
- 3) The height of the stone outlet weir should not exceed one-half the depth of the ditch or swale. Additionally, the maximum height of the weir must not exceed 2 feet to prevent scour of the toe of the check dam. The stone check dam should be wide enough to reach from bank to bank of the ditch or swale with the weir section in the center of the dam.
- 4) The number of check dams will depend on the length and slope of the ditch or swale.

EVALUATION

It is intended to place stone check dams within the drainage swale located east of the Site 42 landfill, within the drainage swale north of the northwestern portion of the Site 42 landfill, within the drainage swale that traverses the Site 42 landfill, and within the stream south and southwest of the Site 42 landfill as excavation proceeds within the stream itself. The slopes of these drainage ways, the anticipated check dam height, and check dam spacing are provided in the following table.

CLIENT: IHDIV-NSWC, Indian Head, Maryland		JOB NUMBER: 4020-1404	
SUBJECT: Stone Check Dam Evaluation			
BASED ON:		DRAWING NUMBER:	
BY: T.W.S.	CHECKED BY: <i>g.w.</i>	APPROVED BY: DATE:	
Date: 08/22/03	Date: 9-21-03		

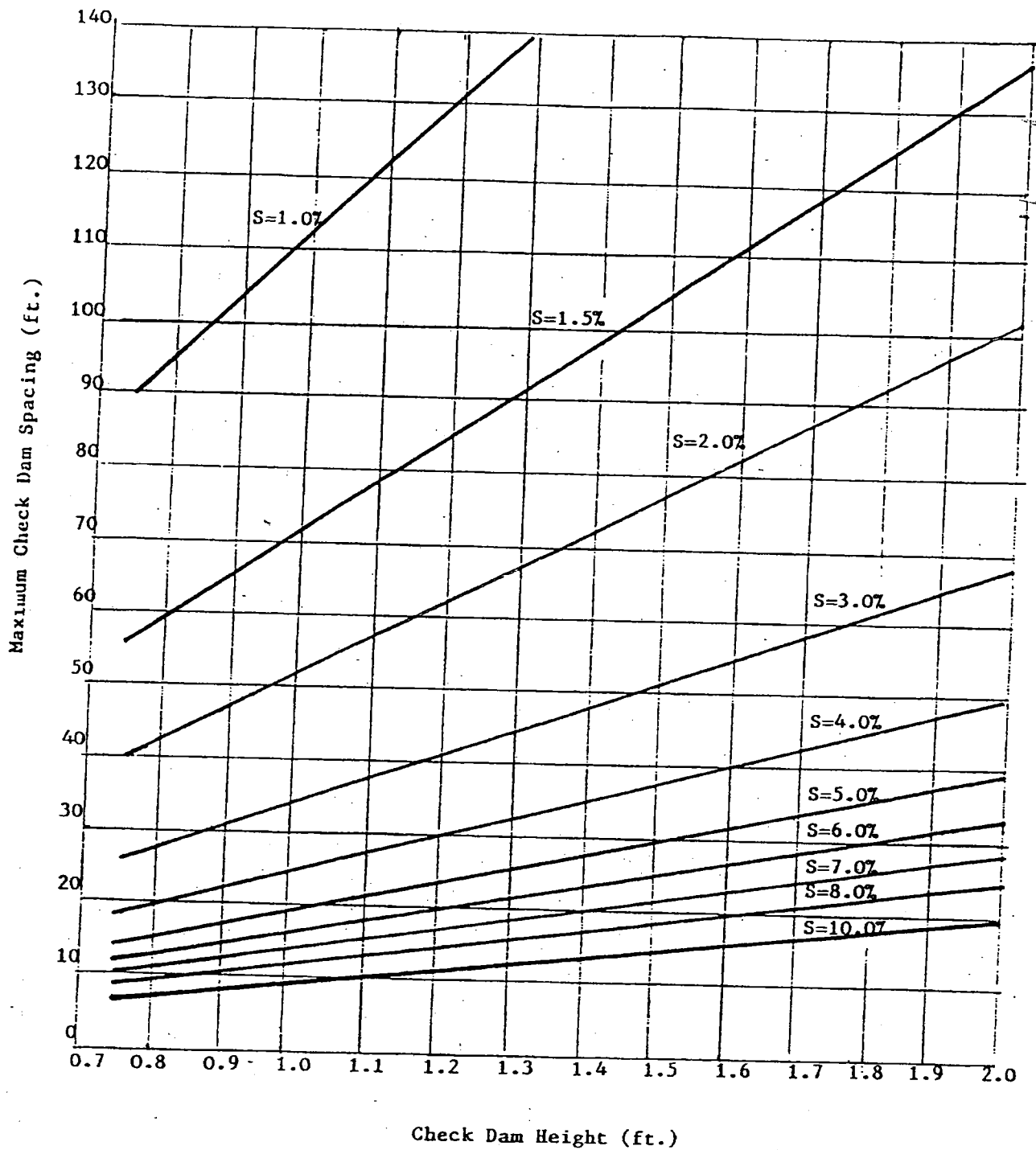
Drainage way (location)	Check Dam Height (ft)	Average Stream Slope ⁽¹⁾	Spacing ⁽²⁾ (ft)
Drainage swale (north of Site 42 landfill)	1	2.22%	50
Drainage swale (east of Site 42 landfill)	2	20.00%	20 ⁽³⁾
Drainage swale (traverses Site 42 landfill)	2	11.20%	20
Stream (south and southwest of Site 42 landfill)	2	1.03%	>140

⁽¹⁾ Measurements taken from the figure provided on page 4 of 4.

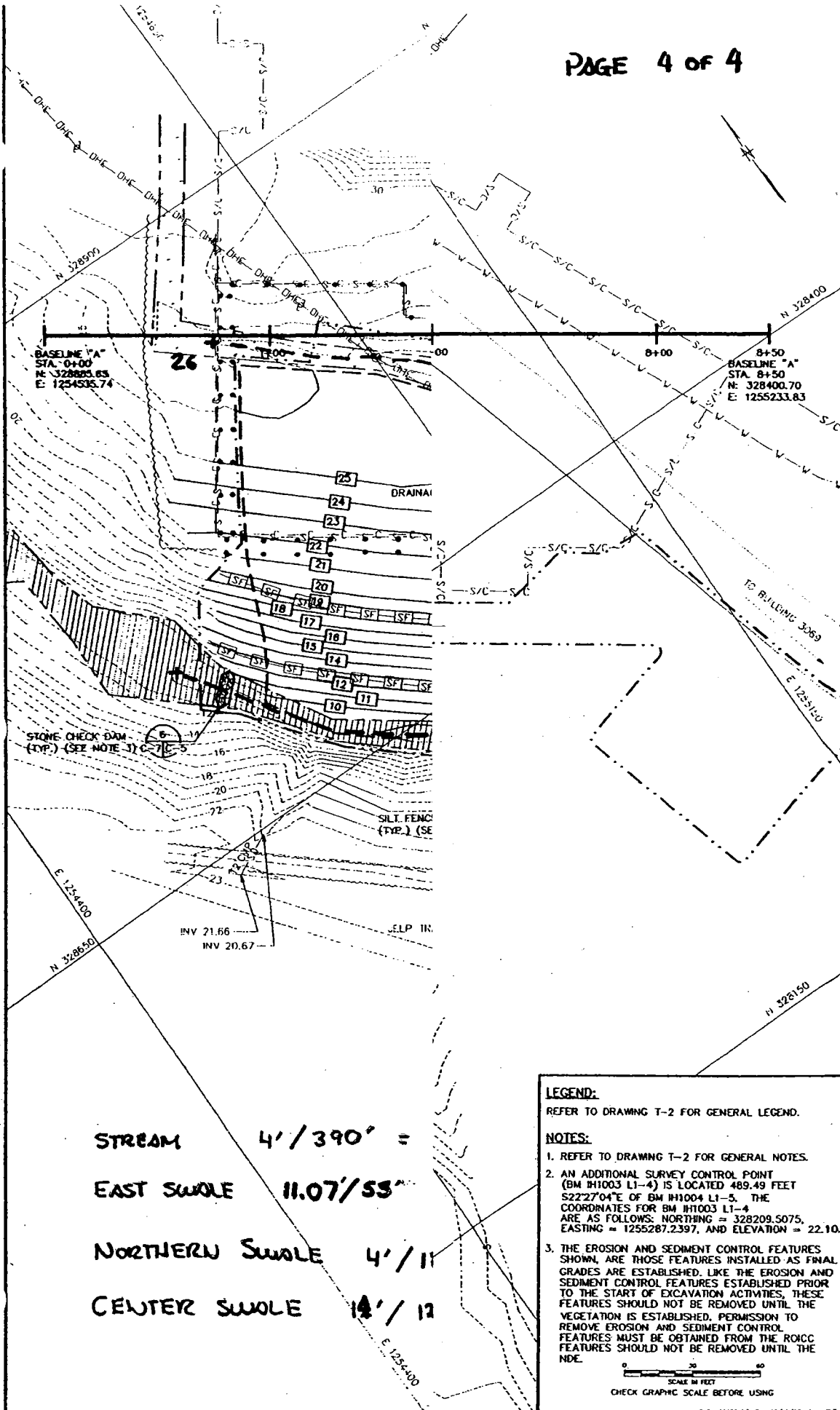
⁽²⁾ Spacing generated using average stream slope, stone check dam height, and the figure provided on page 3 of 4 (Figure 1 on page B-8-4 of Reference 1).

⁽³⁾ Because this swale has an in-stream stone dike at the toe of slope, stone check dam placement will be 20 feet.

FIGURE 1



Design of Stone Check Dam Spacing
($n=0.030$, $V_e = 2.0$ fps)



REVISIONS		DATE		APPROVED	
NO.	DESCRIPTION	DATE	BY	DATE	BY
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ENGINEERING FIELD ACTIVITY-CHESAPEAKE

PROGRESS (65%) SUBMISSION

SITE 42 - OLSEN ROAD LANDFILL

REMEDIAL ACTION DESIGN

FINAL GRADING PLAN

CODE 10. NO. 80091

DRAWING SIZE: D

CONST. CONT. NO.

N62470-97-0-XXXX

SPEC. 21-97-XXXX-XXXX

NAWAC DRAWING NO.

SHEET 9 OF 12

C-7

EROSION AND SEDIMENT CONTROL CONSTRUCTION


- [illegible]

DESIGN CERTIFICATION:

THIS PLAN HAS BEEN DESIGNED IN ACCORDANCE WITH THE 1994
SOIL EROSION AND SEDIMENT CONTROL OR CURRENT REVISIONS
ENVIRONMENT STORMWATER MANAGEMENT REGULATIONS.

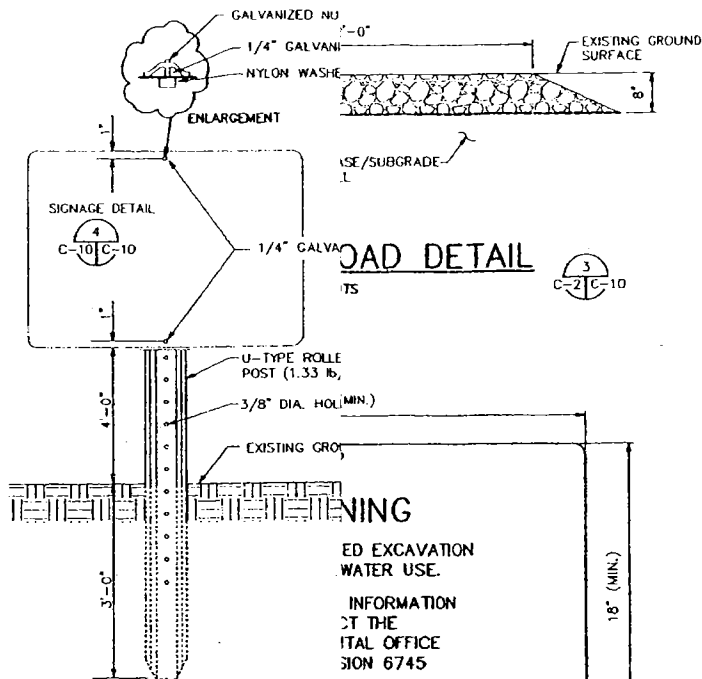
DATE _____

U.S. OR B.L.A. _____

DEPARTMENT OF THE ARMY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON <small>NAVAL DISTRICT WASHINGTON, HOMAN FIELD</small>		NAVAL FACILITIES ENGINEERING DIVISION "HOMAN ROAD WARELAND"		REV. 	DESCRIPTION 	PREP BY 	DATE 	APPROV
<div style="text-align: center;"> <p>FINAL SUBMISSION</p> <p>SITE 42 - OLSEN ROAD LANDFILL</p> <p>REMEDIATION ACTION DESIGN</p> <p>EROSION AND SEDIMENT CONTROL NOTES</p> </div>								
SCALE AREAS: _____  <i>[Signature]</i> 10/10/05 SAT TO DATE: _____								
CORR. LOG. NO.	8009							
SCALE	AS NOTED							
SPEC. NO.	21-03-4402							
CONSTRUCTION CODE NO.	N62470-03-D-4402							
NATURAL DRAINING NO.	3459815							
SHEET	5 of 16							
DWG. SET NO.	C-3							

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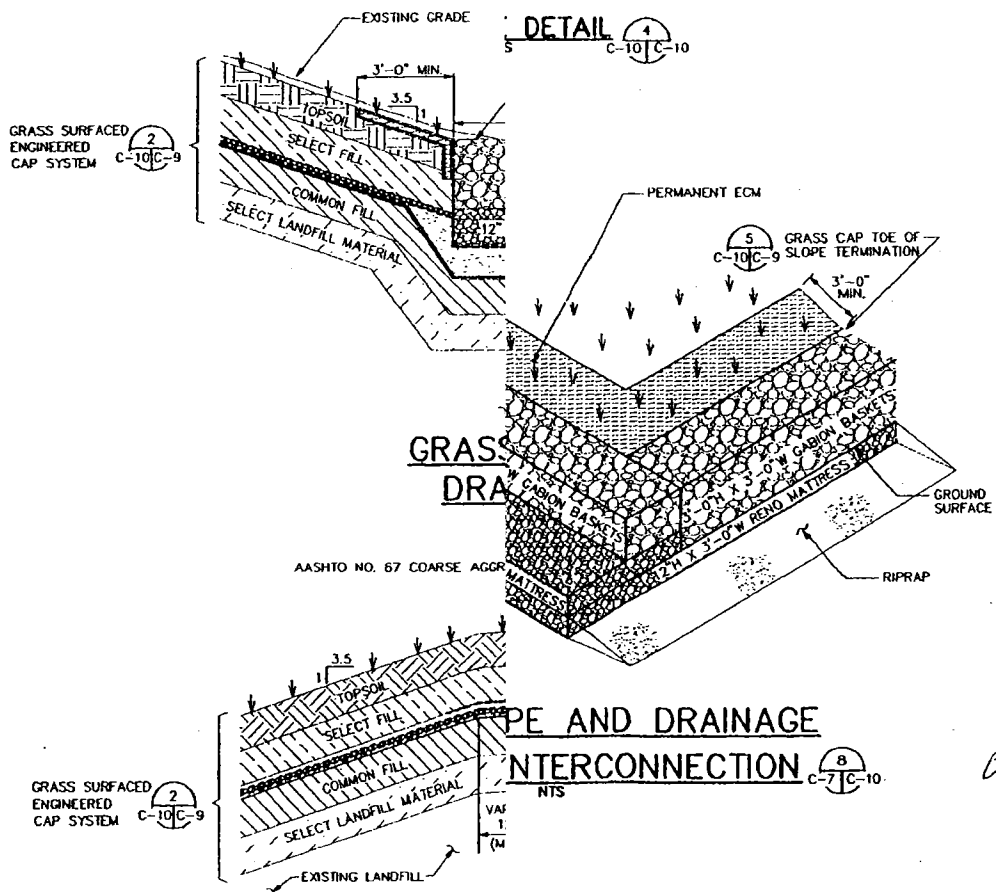
SIGN AND POST DETAIL

NTS

C-12

ISH AND INSTALL WEATHER PROOF
FOOT INTERVALS ALONG THE SITE
DESIGNATED BY THE CONTRACTING

ERING ON WHITE BACKGROUND.



PIPE AND DRAINAGE INTERCONNECTION

NTS

C-7/C-10

PIPI

TITLE: REMEDIAL ACTION DESIGN SHEET: 12 OF 16 DATE: 3/10/05		PREP BY: DATE APPROVED: DATE
PROJECT: NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON SITE: 42 - OLSEN ROAD LANDFILL DRAWING NO.: 3459872		REV. DESCRIPTION 1. DRIVING POST DETAIL 2. SIGN AND POST DETAIL 3. GRASS SURFACED ENGINEERED CAP SYSTEM 4. PIPE AND DRAINAGE INTERCONNECTION 5. GRASS CAP TOE OF SLOPE TERMINATION
DESIGNED BY: DATE CHECKED BY: DATE APPROVED BY: DATE		OFFICER IN CHARGE: DATE APPROVED: DATE
SEAL AREA: DATE SEAL NO.: DATE		APPROVED: DATE

.

Attachment 2



Robert L. Ehrlich, Jr.
Governor

Kendl P. Philbrick
Acting Secretary

Michael S. Steele
Lt. Governor

**WATER MANAGEMENT ADMINISTRATION
STORMWATER MANAGEMENT WAIVER APPLICATION**

OWNER: _____ MDE NO.: _____
ADDRESS: _____ PROJECT NO.: _____
_____ LOCATION: _____
CONSULTANT: _____

DESCRIPTION: _____
I/We, the Owner/Owners hereby request a stormwater management waiver be granted for the above referenced project in accordance with the following section of the Stormwater Management Guidelines for State and Federal Projects:

- ☐ 3.3.A.1. Contract plans and provisions, stormwater management report.
☐ 3.3.A.2. Contract plans and provisions, stormwater management report.
☐ 3.3.A.3. Contract plans and provisions, stormwater management report.
☐ 3.3.B.1. Contract plans and provisions, stormwater management report.
☐ 3.3.B.2. Contract plans and provisions, stormwater management report, downstream impact investigation.
☐ 3.3.B.3. Contract plans and provisions, stormwater management report.
☐ 3.3.B.4. Contract plans and provisions, stormwater management report, downstream impact investigation.
☐ 3.3.B.5. Contract plans and provisions, stormwater management report, downstream impact investigation.
☐ 3.3.B.6. Contract plans and provisions, stormwater management report, downstream impact investigation.

Other evidence submitted: _____

Owner's Name _____ Signature _____ Date _____

☐ Approved ☐ Denied/Reason _____

By _____
Water Resources Reviewer _____ Date _____

Submit to: Maryland Department of the Environment
Water Management Administration
Sediment and Stormwater Plan Review Division
1800 Washington Boulevard, 4th Floor
Baltimore, MD 21230

If a project involves a waiver request for more than one (1) drainage area, a Stormwater Management Waiver Application is required for each drainage area.

Appendix E
Environmental Protection Plan (EPP)

**FINAL
ENVIRONMENTAL PROTECTION PLAN FOR
SITE 42 - OLSEN ROAD LANDFILL AND SITE 17
NAVAL DISTRICT WASHINGTON INDIAN HEAD
INDIAN HEAD, MARYLAND**

Contract No. N62470-03-D-4402

Task Order No. 011

Prepared for:

Naval Facilities Engineering Command Washington
1314 Harwood Street, S.E.
Washington Navy Yard, DC 20374-5018

Prepared by:

Field Support Services, Inc.
6303 Ivy Lane, Suite 800
Greenbelt, Maryland 20770

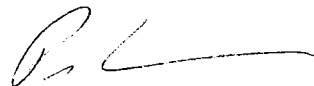
and

Shaw Environmental, Inc.
2790 Mosside Boulevard
Monroeville, Pennsylvania 15146-2792

Reviewed by:



Steve Carriere, PMP
Project Manager
Shaw Environmental, Inc.



Paul Karmazinski
Program Manager
Field Support Services, Inc.

August 2005
Project No. 115273

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List of Acronyms

CDD	Construction and Demolition Debris
CFR	Code of Federal Regulations
EC	Emergency Coordinator
EPP	Environmental Protection Plan
FADL	Field Activity Daily Log
FSSI	Field Support Services, Inc.
LLDPE	Linear Low Density Polyethylene
MDE	Maryland Department of the Environment
MSDSs	Material Safety Data Sheets
Navy	United States Navy
NDW-IH	Naval District Washington Indian Head
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
PM	Project Manager
Shaw	Shaw Environmental, Inc.
SPCCP	Spill Prevention, Control, and Countermeasures Plan
SS	Site Superintendent

SSHSP Site-Specific Health and Safety Plan

SSO Site Safety Officer

USACE United States Army Corps of Engineers

UXO Unexploded Ordnance

1.0 Introduction

The purpose of this Environmental Protection Plan (EPP) is to present information needed to minimize the hazards to human health and the environment from fires, explosions, spills, or any unplanned or sudden release of pollutants during the cap installation, soil excavation, drum removal, and related activities at Sites 42 and 17, located within Naval District Washington Indian Head (NDW-IH), Indian Head, Maryland. The remedial/removal activities will be performed by Field Support Services, Inc. (FSSI) and Shaw Environmental Inc. (Shaw) under contract N62470-03-D-4401, Task Order No. 011.

This EPP fulfills the requirements outlined in Section 01115N, Paragraph 1.3(d) “Environmental Protection Plan,” and in the following documents:

- Code of Federal Regulations (CFR):
 - 29 CFR 1910 Subpart G: Occupational Health and Environmental Control
 - 40 CFR 261: Identification and Listing of Hazardous Waste
 - 40 CFR 262: Generators of Hazardous Waste
 - 40 CFR 263: Transporters of Hazardous Waste
 - 49 CFR 178: Shipping Container Specification
- United States Army Corps of Engineers (USACE)
 - COE EP-1165-2-304: 1976 Flood Plain Regulations for Flood Plain Management.

This EPP is intended for use during the remedial/removal construction activities at the sites. This EPP establishes guidelines that must be followed by FSSI/Shaw during activities at the sites and must be used in conjunction with the other project plans, project specifications, and design drawings. This document particularly goes hand-in-hand with the Site-Specific Health and Safety Plan (SSHSP). Field staff administering health and safety practices will also coordinate and monitor the activities required and associated with this EPP. A preconstruction survey will be conducted prior to mobilization to the site. The results of this survey will be submitted to the Navy prior to the start of field activities.

1.1 Scope of Work for Site 42

The remedial activities to be conducted at Site 42 include:

- Mobilization and site preparation
- Site layout and photographic documentation
- Installation of erosion and sediment controls
- Removal and relocation of utilities
- Abandonment and installation of monitoring wells
- Clearing and grubbing
- Construction of gravel access roads
- Construction of the decontamination pads
- Construction of a material handling pad and screening area
- Excavation, screening, and load-out of hazardous materials
- Field sampling and offsite analyses
- Initial grading and common fill placement
- Installation of a 40-mil linear low density polyethylene (LLDPE) cap
- Placement of cover soils
- Placement of topsoil
- Installation of a cap drain, gabion wall, and reno mattress
- Installation of an asphalt cover
- Restoration of an existing drainage channel
- Wetland mitigation
- Revegetation and planting
- Final survey.

1.2 Scope of Work for Site 17

The removal activities to be conducted at Site 17 include:

- Mobilization and site preparation
- Site Layout and photographic documentation
- Installation of erosion and sediment controls
- Clearing and grubbing
- Construction of a material storage pad
- Construction of a decontamination pad
- Drum overpacking and removal
- Excavation, screening and transportation of soils
- Field sampling and offsite analyses
- Transportation and disposal of non-hazardous debris
- Placement of backfill and topsoil
- Revegetation
- Final survey.

1.3 Additional Project Activities

Additional activities to be conducted for both Site 42 and Site 17 include:

- Final inspection
- Teardown and demobilization
- Contractors closeout report.

2.0 Organization Structure For Implementation

This section describes the personnel and required chain of command that will control and direct environmental protection activities.

2.1 Responsible Parties

The United States Navy (Navy) is the owner of the project sites and is the responsible party for the landfill closure activities. The US Navy has contracted FSSI/Shaw to perform the remedial/removal activities. Throughout the duration of activities, FSSI/Shaw will notify the Navy of any environmental protection incidents as soon as possible.

2.1.1 Navy

The Navy is responsible for all notifications to local, state, and federal authorities, and will oversee FSSI/Shaw's execution of environmental protection.

2.1.2 FSSI/Shaw

FSSI/Shaw is responsible for implementing environmental protection procedures and is responsible for all information contained in this document and as described in the SSHSP.

2.2 Emergency Services

A summary of local and state emergency service agencies is listed in the SSHSP. Individual emergency agencies and responsibilities are presented in the sections to follow.

2.2.1 Police

The Indian Head Security Police will provide police support for blocking traffic, and other related duties during environmental protection situations. Unlawful entry into the project sites will also be reported to the Security Police.

2.2.2 Fire Department

All environmental protection situations requiring fire department personnel and equipment will be reported to the Indian Head Fire Department.

2.3 Coordination Responsibilities

All environmental protection provisions will be implemented by means of the FSSI/Shaw organizational structure. FSSI/Shaw is responsible for coordination, training, drills, and notification to the Navy, and other aspects of the EPP.

2.3.1 Project Manager

The Project Manager (PM) is ultimately responsible for completion of the project in accordance with the project plans, project specifications, and design drawings. The PM delegates the authority for the implementation, maintenance, and compliance of the project activities with this document and the SSHSP to the Site Safety Officer (SSO), or Site Superintendent (SS) in the absence of the SSO.

2.3.2 Site Safety Officer

The SSO will be responsible for all environmental health and safety activities and will be responsible for ensuring the implementation of this EPP in the field. These activities will include air monitoring activities, decontamination procedures, environmental protection activities, and emergency response procedures. The SSO will also be responsible for training of on-site personnel as may be necessary. The SSO has the authority to stop any operation that threatens the health and/or safety of the team or surrounding populace. The weekly environmental protection inspections and daily health and safety activities may be conducted by the SSO or the SS. The SS is responsible for assuring that the daily environmental protection is performed.

2.3.3 Site Superintendent

The SS is responsible for field implementation of the environmental procedures and the health and safety program during the course of the work, and takes on a lead role in this when the SSO is not present. This responsibility includes advising site workers of the specific health and safety requirements and consulting with the SSO regarding appropriate changes to the EPP and the SSHSP.

2.3.4 Emergency Coordinator

The Emergency Coordinator (EC) will implement and coordinate all environmental procedures during spills and releases, or any other emergency situations. During an emergency, the EC will activate alarm systems, notify the Navy, identify the problem, assess the health or environmental hazards, and take all reasonable measures to stabilize the situation. The EC will also be

responsible for follow-up activities after the incident such as treating, storing, or disposing of residues and impacted soil, decontamination and maintenance of emergency equipment, and submission of any reports. The EC is also responsible for personnel training and evacuation drills. The EC will be on-site during all remedial/removal operations. The SS or the SSO will be the EC, depending upon who is on site.

2.3.5 Site Personnel

All personnel will be responsible for working in a safe and healthy manner. They will be required to comply with all applicable local, state and federal rules and regulations, as defined in the SSHSP.

3.0 Materials Inventory Compatibility

This section contains information regarding the materials that may be involved in a spill or release.

Table 3-1 lists the materials that may be present on-site during remedial/removal activities. This table will be updated during the course of the project to reflect materials stored on site.

3.1 On-Site Materials

The suspect constituents that potentially could be encountered are methane and other volatile gases associated with organic decay of municipal solid waste. (However, based on the age of the landfills, landfill gases are not expected to be in harmful or at dangerous concentrations). On-site materials consist of (but are not limited to): general construction waste, anticipated waste streams, soils, liquids, drums, unexploded ordnance (UXO), and hazardous and municipal waste.

3.2 Organic Vapor Releases

Organic vapor releases may occur during excavation activities. Organic vapor concentrations in the air during excavation activities will be monitored using air-monitoring equipment such as a photoionization detector (PID). Air monitoring requirements are described in the SSHSP.

3.3 Fuel And Flammable Liquids

To complete the project, FSSI/Shaw will contain on-site fuels and oils for construction vehicles. The types of materials that may be stored at the fuel depot are as follows:

- Diesel fuel
- Gasoline
- Motor transmission oils
- Greases
- Used oil
- Hydraulic fluid.

3.4 Other Materials of Concern

Other materials necessary to complete the project that have the potential for spills and releases are listed below. The exact quantity and type of these materials will be determined during remedial/removal activities:

- Portland cement
- Bentonite
- Agricultural lime
- Fertilizer.

3.5 Hazardous Material Generation and Storage

The scope of work for the project identifies an area containing approximately 1,200 cubic yards of soil that has been characterized as containing potential hazardous soil. This material will be excavated and transported to an on-base material handling area where it will be screened to remove the debris and casings. The material will then be sampled and disposed of off base at an approved facility. FSSI/Shaw will prepare waste manifests for the disposal of this material. The manifests will be signed by the Navy prior to final disposition.

During screening and prior to off-site disposal, any material that is not being processed will be placed in stockpiles and covered with polyethylene tarps to protect the material from potentially impacting human health and the environment from airborne or waterborne contact.

3.6 Material Compatibility

The materials mentioned in Sections 3.1 to 3.5 are not anticipated to be mixed or combined during site operations, and will be stored in a manner to prevent accidental mixing in the event of a spill/release.

3.7 Material Safety Data Sheets

A record of the material safety data sheets (MSDSs) for all materials that are stored onsite will be maintained and updated by the SSO throughout the course of the project.

4.0 Emergency and Decontamination Equipment

This section discusses the types of emergency equipment that will be used in the event of a spill or other emergency situation.

4.1 Small-Scale Emergency Equipment

Small-scale emergency equipment will include the following:

- Dry chemical, ABC-rated fire extinguishers
- Spill control equipment
- Absorbent materials
- Decontamination equipment
- Air purifying respirators
- Radio and telephone equipment
- Windscreens
- Various hand tools.

This equipment will be made accessible to all on-site workers. Locations of such equipment will be posted at the FSSI/Shaw office trailer. A list of small equipment is provided in Table 4-1.

4.2 Large-Scale Emergency Equipment

Large-scale emergency equipment will include the same equipment used in the ongoing construction activities. The equipment will include front-end loaders, bulldozers, and excavators. Other emergency equipment may be obtained from the local fire department or other emergency response agencies, if required. A list of large equipment proposed for on-site use is provided in Table 4-1.

4.3 Decontamination Equipment

Equipment necessary for decontamination activities will be provided, installed, and verified in working order prior to any site operations. Equipment for the decontamination area includes the following items:

- Decontamination pad and sump
- Clean water supply
- Detergent solution
- Containers for used decontamination solution and decontamination residues/solids
- Brushes
- Waste containers.

The decontamination pad will be a polyvinyl-lined platform and frame constructed of wood that will be configured to drain to an integral 55-gallon drum. A sump pump will be installed in the drum. The pump will discharge through a hose to a poly tank. The platform will be sufficiently reinforced to allow for heavy vehicle ingress and egress from the decon pad.

5.0 Site Evacuation Plan

This section details the procedures to be followed in the event that any of the sites need to be evacuated.

5.1 Site Evacuation Signal

All site personnel, including equipment operators, technicians, and supervisors will evacuate the site upon hearing the evacuation signal. The signal will consist of a continuous blast from an air horn. The blast will be at least 15 seconds in duration, and will be sounded from a location that broadcasts clearly to the entire site. The signal will be repeated at least two times to alert all personnel. A verbal evacuation command will also be broadcasted via hand-held radio over the site channel to alert operators who may not hear the air horn signal. A visual signal (clutching the throat with the hands) will also indicate a site evacuation.

5.2 Site Evacuation and Routes

After the evacuation signal is sounded, all personnel will immediately proceed to the meeting point. The meeting point will be established in the site vicinity at the beginning of each job for each site. This area is to be used by personnel working at the site. One supervisory person will proceed to this location. Radio contact will be maintained with all management staff. Wind direction will be noted during the evacuation by observing windsocks (to be installed). Every attempt to reach the upwind meeting location must be made by all site personnel. All equipment, trucks, and other internal combustion engines will be shut down prior to personnel evacuation if the equipment can be reached without risking personal safety.

Evacuation routes and meeting points will depend on a particular site and the current project phase for each site. In general, the most direct route should be made when evacuating to a meeting point. Figure 5-1 shows the site evacuation routes and the expected meeting point locations for Site 42. Figure 5-2 shows the site evacuation routes and the expected meeting point locations for Site 17.

The EC will contact the Navy to inform them of the nature and extent of the emergency. A meeting point coordinator will be chosen at the meeting point. This person will generally be the most senior person (e.g., SSO, EC, foreman, or other supervisor) at the location. The meeting point coordinator will follow actions described in Section 5.3.

5.3 Post Evacuation Actions

A head count of personnel assembled at the meeting point will be taken by the meeting point coordinator immediately after the evacuation and provided to the EC. Information regarding missing and/or injured personnel will be brought to the immediate attention of the meeting point coordinator. No personnel will attempt to re-enter the site at this time. The EC or appointed representative will coordinate activities with the Navy. After the emergency has been resolved, the EC will indicate when personnel can enter the site and resume work.

5.4 Site Evacuation Drill

All site personnel must be familiar with the evacuation signal and evacuation procedures prior to any site operations. The evacuation plan will be executed during an announced drill within two days after major activities (i.e., clearing and grubbing, earthmoving, etc.) have begun at a site. The EC will announce the drill time to all site personnel and will notify the Navy authorities regarding the nature and time of the drill. The drill will include contacting authorities to verify communication procedures.

6.0 Spill Prevention and Response

This section discusses the techniques that will be utilized to minimize the potential for spills and will describe the measures that will be implemented in response to a spill.

6.1 Grading/Excavation Areas

The grading/excavation areas contain contaminated soil, municipal waste, construction and demolition debris (CDD), and potential UXO that will be graded to the design contours and placed under the geomembrane cap. The primary potential spill source during this work is runoff, or water from the excavation. Construction and excavation areas will be bermed with soil, if necessary, to contain runoff material within the work areas. Soil berms, if needed, would be in addition to temporary erosion and sediment controls (e.g., silt fencing).

6.2 Fuel Storage

Vehicle fuels and oils will be stored in the fuel depot area (i.e., the storage area near the FSSI/Shaw storage trailer) in approved storage containers. The fuel tanks, if employed, will be anchored to the ground, stabilized on skids, or placed on saddles to prevent overturning and rolling. Containers will be placed outside of the maximum turning radius of all vehicles, as well as turnaround or unloading zones. Secondary containment is required for all fuel containers larger than five gallons. Secondary containment will be 110 % of the aggregate storage volume. All tanks will be placarded with the National Fire Safety system for hazardous material classification and the tanks will be electrically grounded. A Spill Prevention, Control, and Countermeasures Plan (SPCCP), required under 40 CFR 112, will be prepared if total on-site petroleum aggregate aboveground storage capacity is greater than 1,320 gallons.

6.3 On-Site Material Transportation

All materials will be transported on and around the site via access roads. Practices for preventing material spills will include not overfilling trucks, drivers traveling at posted speeds, and having access roads maintained in good condition. Additional information is provided in the SSHSP.

6.4 Severe Weather

Short-duration, high-intensity rain showers could create unexpected erosion and drainage problems such as slope and containment berm erosion. After such events, all containment

devices will be closely inspected for structural and practical integrity. In addition, spillage or leakage will be immediately corrected. Repair to these containment devices will be made as soon as possible or at least before construction continues and will be logged in the Site Supervisor's daily report.

7.0 Preventative Actions and Employee Training

This section discusses the preventative measures that will be utilized to minimize the possibility of a spill or discharge.

7.1 Inspection

Inspections of site areas will be performed by the FSSI/Shaw SS to verify that procedures for proper storage, handling, and transport of materials are being followed. Inspection and monitoring methods will be through visual observation. Monitoring equipment as described in Section 8.0 will be used when necessary. Areas that will be inspected regularly include the following:

- Construction/excavation areas
- Fuel depots – various fuels and oils.

Other areas and items that will be monitored and noted in the site logbook include:

- Evidence of spilled materials along drainage ditches
- Effectiveness of housekeeping practices
- Various shipping and storage containers used throughout the site
- Staging areas
- Proper placards and labeling of truck and tank contents.

Inspections of hazardous material containers will be conducted weekly and documented in the SSO's Field Activity Daily Log (FADL).

7.2 Equipment Maintenance

All construction equipment will be properly maintained to facilitate safe operation. Equipment (especially trucks) will be properly maintained to minimize spillage or leakage that may occur during on-site transport operations. Further preventive maintenance on trucks is described in

Section 7.4.2. Maintenance of heavy equipment is performed by the equipment vendor, who will dispose of waste oil. Spill kits will be ready and available during all maintenance activities.

7.3 Calibration of Monitoring Equipment

It is important that all environmental monitoring equipment be calibrated so that accurate readings of potential spilled or leaked materials may be detected upon inspection. Calibration frequency and procedures will be followed as per the manufacturer's recommendations.

FSSI/Shaw will retain calibration records on site.

7.4 Housekeeping Program

FSSI/Shaw's housekeeping program includes neat and orderly storage of materials and equipment, proper truck and tank placards, prompt removal of spillage, regular refuse pickup and disposal, and maintenance of roads and surfaces.

7.4.1 Small Spillage

Small spills (less than 10 gallons) may include solid materials or liquid materials being mishandled, dumped, leaked, knocked over, etc. Any material spillage will be immediately contained, collected, and placed on the drying pad for later disposal. Work will be performed such that exposed source materials remain within the limits of the construction or below the limits of temporarily constructed soil berms. All spilled liquids will be contained and collected by absorbent materials and the materials taken to the decon pad area. Spilled fuel and impacted soil will be containerized and stored at the drum storage area near the FSSI/Shaw storage trailer for later disposal. The EC will notify the Navy in the event of a spill greater than 10 gallons. The spill will be cleaned up in accordance with Navy and Maryland Department of the Environment (MDE) requirements.

7.4.2 Trucking

All hauling vehicles will be maintained in good operating condition. Tires will be properly inflated and will have adequate tread depth as per the tire manufacture's recommendations. Trucks will not be overloaded, since overloaded trucks increase the possibility of material spillage. Truck end gates will be inspected to confirm that they close and seal properly. The tires and undercarriages of all trucks leaving the construction sites shall be visually checked by FSSI/Shaw to minimize the tracking of soil and dust onto the facility's roads. Trucks entering from off-site with loads will be tarped to prevent excessive dust.

7.4.3 Worker Training

All employees with the potential of exposure to hazardous substances will be required to attend and complete the Occupational Health and Safety Administration (OSHA) 40-hour Health and Safety course (Hazardous Waste Operations and Emergency Response) as per 29 CFR 1910.120. All site employees requiring 40-hour health and safety training will be current with respect to 8-hour annual refresher training.

A site-specific training program will involve at least one hour of instruction per employee, and will include basic munitions recognition training. At a minimum, the training program will ensure that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures and emergency equipment systems including, where applicable:

- Procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment
- Key parameters for automatic cut-off systems
- Communication and alarm procedures
- Response to fires and explosions
- Site evacuation procedures
- Shut-down operation.

In addition, the site-specific training program will address other aspects of the EPP, such as preventive maintenance, inspection and monitoring, and housekeeping practices, etc.

Job-specific environmental protection and health and safety instructions will be reviewed before beginning each new phase of work. Weekly, or more often if conditions require, the SSO or SS will conduct follow-up training related to a change in operations or any other training deemed necessary by the SSO. FSSI/Shaw will hold daily safety meetings (tailgate safety meetings) to discuss the current activities. Site evacuation training will be provided as described in Section 5.0 of this Plan.

7.4.4 Employee Training Documentation

Training records for all site personnel will be maintained on site by the SSO and will be updated as necessary as the project progresses. These records will be available for review by the Navy upon request.

8.0 Air Monitoring Requirements

Air monitoring will be performed as required in the SSHSP. A PID will be used to provide real-time, semi-quantitative data on total organic vapor concentrations in and around the breathing zone of workers and downwind of activities at the perimeter of the site. This instrument will be calibrated daily and organic vapor concentration will be monitored during site activities.

The SSHSP identifies additional air monitoring instrumentation (i.e., dust monitor, explosimeter) and requirements. The SSHSP also defines action levels for upgrading employee protection and instituting emergency actions. The air monitoring will determine concentrations of site contaminants within the ambient air and workers' breathing zones. The air monitoring measurements will be compared to OSHA standards, which are the basis for defining the site action levels. The SSO will make the decision regarding equipment upgrades and emergency action based on the air quality measurements.

A windsock will be installed at each site to monitor the wind direction. The wind direction will be noted by the EC and other site personnel so that all personnel are upwind of the situation during site evacuation. Windsocks will be placed at each of the sites and in the project trailer area.

9.0 Earthmoving Activities

The project activities that require erosion and sediment structures for the control of runoff are site preparation, soil and sediment excavation, geomembrane cap placement, and backfilling. Earthmoving activities for Site 42 and Site 17 will be performed in a manner that will minimize the extent of surface area disturbed at any one time. The earthmoving activities are described in the following sections.

9.1 Site Preparation

Construction activities that will promote runoff during site preparation include clearing and grubbing and access road construction. All site preparation work will be executed such that all runoff generated passes through erosion and sediment control structures, permanent or temporary, prior to discharge from the site.

9.2 Sediment Excavation

Sediment excavation work involves clearing and grubbing, and removal and disposal of sediment from the unnamed stream channel adjacent to Site 42. Temporary erosion and sediment controls, including stone check dams and an in-stream stone dike in the drainage channel on the downstream edge of the sediment removal area, will be installed to control runoff and to prevent migration of sediment out of the work area. These structures will remain in place until the site is re-vegetated.

9.3 Soil Cover Placement

Soil grading and excavation work will be performed as required to construct the geomembrane cap. At a minimum, prior to earthmoving activities, silt fence and stone check dams will be installed on the downslope side of the fill area. Additionally, as backfill is placed, the fill area will be graded such that all runoff passes through erosion and sediment control structures. Any erosion and sediment control structure that is installed/constructed during soil placement activities will remain in place until cover installation activities are complete and the site is re-vegetated.

10.0 Preconstruction Survey Results

The results of the preconstruction survey will be presented in the Environmental Conditions Report. This report will be submitted to the Navy prior to the start of remedial/removal activities at Site 42 and Site 17.

11.0 Permitting Requirements

The following permits have been identified for work at Site 42:

- Base Dig Permit
- Erosion and Sediment Control Plan (Appendix D of the Work Plan)
- Explosive Safety Submission Waiver, approved on 18 Nov 2004 (Appendix H of the Work Plan)
- Site Approval
- Signed Waste Manifests.

The following permits have been identified for work at Site 17:

- Base Dig Permit
- Erosion and Sediment Control Plan (Appendix D of the Work Plan)
- Explosive Safety Submission Waiver, approved on 25 Jan 2005 (Appendix H of the Work Plan)
- Signed Waste Manifests.

Tables

Table 3-1

Material Inventory
Sites 42 and 17
Naval District Washington Indian Head
Indian Head, Maryland

<i>Material</i>	<i>Unit</i>	<i>Quantity</i>	<i>Location</i>	<i>Hazard Class</i>
Impacted soil/construction rubble	Cubic yards	(I)	ERP Site Areas	N/A
Diesel Fuel (H)	Gallons	(I)	Project Trailer Area	Combustible
Gasoline	Gallons	(I)	Project Trailer Area	Flammable
Portland Cement	Pounds	(I)	Project Trailer Area	Corrosive
Bentonite	Pounds	(I)	Project Trailer Area	N/A
Lime, Fertilizer	Pounds	(I)	Project Trailer Area	Corrosive

Key:

(H) Includes motor transmission oils, greases, used oil, hydraulic fluid

(I) Ongoing activity. Quantities to be determined during construction activities.

Table 4-1

**Equipment List
Sites 42 and 17
Naval District Washington Indian Head
Indian Head, Maryland**

Equipment	Use	Location
Large Equipment:		
Dozer	General Material Transportation; Clearing/Excavation; and Grading	At Each Site During Work Activities
Excavator		
Front-end Loader		
Water Tank Truck	Moisture/Dust Control	
FSSI/Shaw Office Trailer (1)	Field Management	Adjacent to Site 42
FSSI/Shaw Crew Break Trailer	Work Breaks	
FSSI/Shaw Storage Trailer	Material Storage	
Small Equipment:		
Absorbent Materials	Spill Prevention	FSSI/Shaw Storage Trailer
Basket Stretchers	Health and Safety	FSSI/Shaw Storage Trailer
Camera/Photo Equipment	Project Records	FSSI/Shaw Storage Trailer
Chainsaw	Trimming; Clearing and Grubbing	FSSI/Shaw Storage Trailer
Decontamination equipment with a clean water supply (70-80°F)	Equipment Decon	At Each Site During Work Activities
First-Aid Supplies	Health and Safety	FSSI/Shaw Storage Trailer
Metal Saw (Power)	Debris Cutting	FSSI/Shaw Storage Trailer
ABC-Rated Portable Fire Extinguishers(1)	Safety; Fire Control	In Each Vehicle
2-Way Radio	Communication	Supervisory Personnel
Respirators	Health and Safety	FSSI/Shaw Storage Trailer
Submersible Pumps	Dewatering/Decon	FSSI/Shaw Storage Trailer
Welding/Cutting Equipment	Debris Cutting	FSSI/Shaw Storage Trailer

Note:

(1) ABC-rated portable fire extinguishers to include two 20-pound units per trailer, one 10-pound unit in each piece of mobile equipment, and one 20-pound unit at each major mechanical operation.

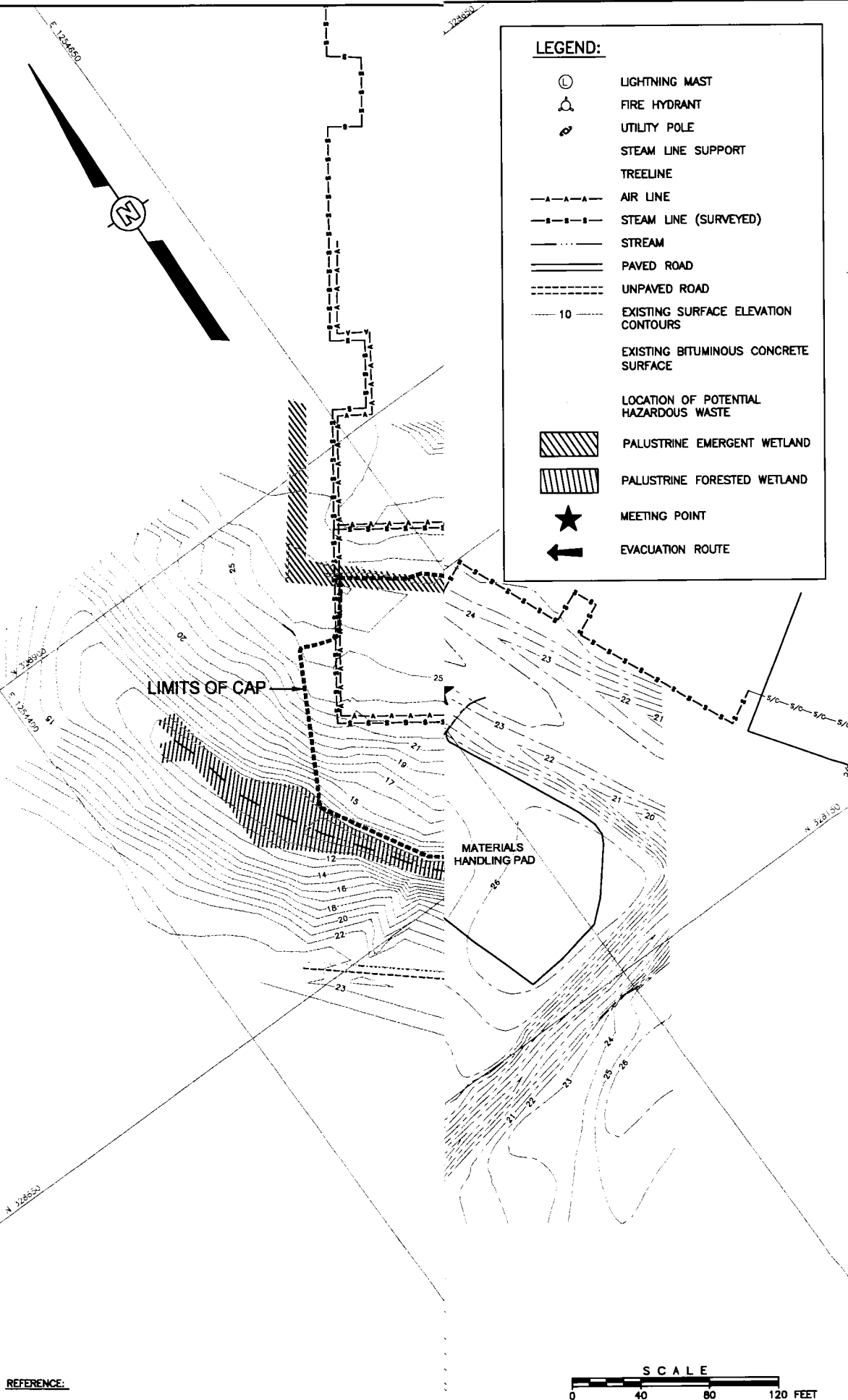
Figures

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 Pittsburgh, PA

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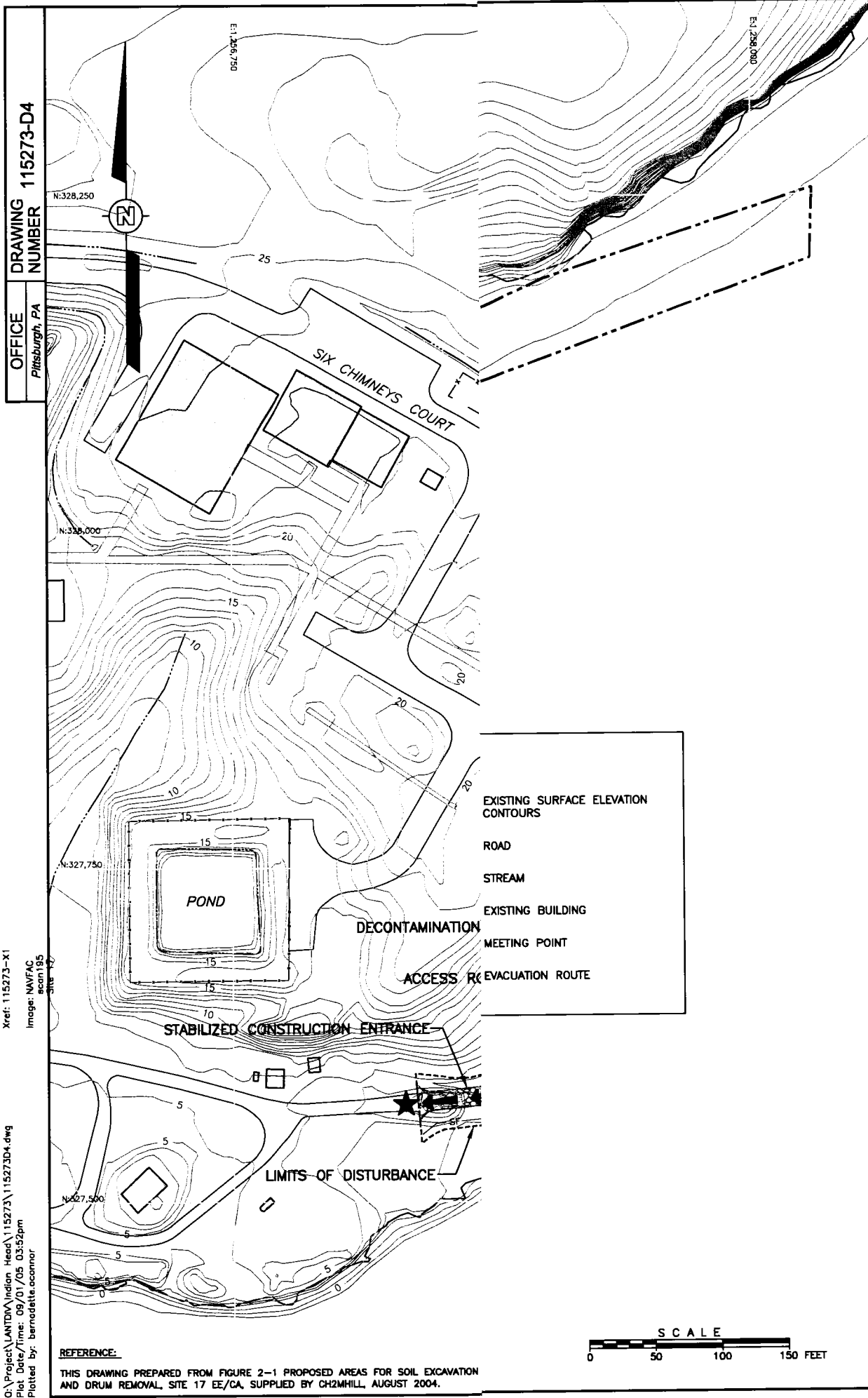


Shaw's Shaw Environmental, Inc.

 NAVFAC Naval Facilities Engineering Command NAVFAC WASHINGTON		INDIAN HEAD, MARYLAND NAVAL DISTRICT WASHINGTON, INDIAN HEAD SITE 42 AND SITE 17 - ENVIRONMENTAL PROTECTION PLAN		SITE 42 - EVACUATION ROUTE									
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CONSTR. CONTRACT NO. N62470-03-D-440													
NAVFAC DRAWING NO. ---													
SHEET I.D.													
FIGURE 5-1													
 Shaw's Shaw Environmental, Inc.				DESIGNED BY J. Folsom	4/12/05	CHECKED BY P. Gornick	6/31/05	REV	DATE	BY	CHK'D	APR'D	DESCRIPTION/ISSUE
				DRAWN BY B. Folsom	4/12/05	APPROVED BY S. Corriere	6/31/05						REVISIONS

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REFERENCE:

THIS DRAWING PREPARED FROM FIGURE 2-1 PROPOSED AREAS FOR SOIL EXCAVATION AND DRUM REMOVAL, SITE 17 EE/CA, SUPPLIED BY CH2MHILL, AUGUST 2004.



NAVAL DISTRICT WASHINGTON, INDIAN HEAD SITE 42 AND SITE 17 - ENVIRONMENTAL PROTECTION PLAN		DESIGNED BY J. Folsom CHECKED BY P. Gamble APPROVED BY S. Corriere	
SITE 17 - EVACUATION ROUTE		REV. DATE BY CHK'D APR'D 1 4/12/05 B. Folsom 4/12/05 S. Corriere	
SCALE: AS SHOWN DELIVERY ORDER NO. 011 CONSTR. CONTRACT NO. N62470-03-D-4402 NAVFAC DRAWING NO.		SHEET I.D. FIGURE 5-2	